Construction Methods

McGRAW-HILL PUBLI... ...ATALOG

BUY WAR BONDS
AND STAMPS
FOR VICTORY

"UNITED WE STAND"

JUNE · 1942

CURRENT JOBS

.... and Who's Doing Them

BUILDINGS

Public — Defense Plant Corp. awarded a $100,000,000 contract for manufacturing plant in Illinois to **Geo. A. Fuller Co.**, of Chicago, **Gage Structural Steel Co.**, and **Duffin Iron Co.**, of Chicago, **Midland Structural Steel Co.**, of Cicero, and **Clinton Bridge Co.**, of Clinton, Ia. **Bethlehem Steel Co.**, of Chicago, to supply steel for the plant. In Texas the **Lummus Co.**, of New York, will construct an industrial plant to cost between $43,000,000 and $73,000,000; Defense Plant Corp. will finance. **Henry Ericsson**, of Chicago, was awarded mill contract in Illinois at an estimated cost of $50,000,000 to be financed by Defense Plant Corp. Successful bidder for $20,000,000 plant contract in Indiana was **Ryan Construction Corp.**, of Evansville. In Michigan, **Austin Co.**, of Detroit, will build an industrial plant for $20,000,000, to be financed by Defense Plant Corp. **Duval Engineering & Construction Co.**, **Batson-Cook Co.** and **George A. Auchter Co.**, of Jacksonville, were successful bidders for $6,599,375 Navy Department contract in Florida. In New York, **John Kennedy & Co.**, local contractor, will build a 1,200 unit housing project for $5,268,000.

Fox Valley Construction Co., Appleton, Wis., and **Weitz Co.**, of Des Moines, Ia., were awarded a plant contract in Wisconsin to exceed $5,000,000. Manufacturing plant in Indiana is under way by **Russ & Harrison**, **L. Colvin**, and **William E. Mohler Co.**, all of Indianapolis, for $5,000,000. Contract for $5,000,000 plant in Kentucky went to **Rust Engineering Co.**, of Pittsburgh, Pa. Lake Shore Village housing project in Ohio, will be built by **H. R. H. Construction Co.**, of New York, at cost of $4,130,800. **O. J. Senum**, of Santa Monica, will build a $4,000,000 industrial plant in California. **Wilaka Construction Co.**, of Baltimore, received contract to construct 900 housing units in Maryland, for $3,927,000. Buildings are under construction in Pennsylvania by **Cauldwell-Wingate Co.**, of New York, at an estimated cost of $3,200,000. Contract for temporary Federal office buildings in Washington, D. C., was awarded to **Geo. A. Fuller Co.**, local contractor, with bid of $3,782,000. **Peter Kiewit Sons Co.**, of Omaha, Neb., obtained a contract to construct 200 buildings in Iowa, with a bid of $3,960,838.

HEAVY CONSTRUCTION

Low bid of $82,982,645 obtained contract for **Panama Constructors, Inc.**, local contractors, in Canal Zone. Navy Department awarded a $26,860,000 contract for improvements in New York, to **Walsh Construction Co.**, **J. Rich Steers, Inc.**, **Cauldwell-Wingate Co. & Raisler Corp.**, of New York. Another Navy Department contract for improvements in North Carolina was awarded to **Goode Construction Corp.**, **Blythe Bros. Co., Inc.**, and **Harrison-Wright Co., Inc.**, of Charlotte, at a cost of $23,946,000. In Virginia, improvements estimated to cost $23,985,000 are under way by **Stone & Webster Engineering Corp.**, of New York. A $7,067,295 contract for improvements in Florida, went to **Hardaway Contracting Co.**, of Columbus, Ga. **M. W. Watson**, of Topeka, received contract for improvements to be made in Kansas to cost more than $5,000,000. **L. E. Dixon Co.**, of Los Angeles, Calif., was low bidder for dam and power house contract to be erected in Tacoma, Wash., with bid of $5,964,384. In Pennsylvania, a $4,324,376 Navy Department contract went to **Spencer, White & Prentis, Inc.**, **Foley Bros., Inc.**, and **Merritt-Chapman-Scott Corp.**, of New York. **Austin Co.**, of Cleveland, Ohio, is engaged in the construction of additional facilities in Washington, for Navy Department, at cost of $3,479,800.

HIGHWAYS

Among recent highway contract awards are the following: California: $696,992 to **N. M. Ball Sons**, of Berkeley; $495,755 to **Basich Bros.**, of Torrance; $307,290 to **A. Teichert & Son, Inc.**, of Sacramento; $1,000,000 to **N. M. Ball Sons**, of Albany. Florida: $1,000,000 to **Cone Bros. Construction Co.**, of Tampa. Georgia: $1,001,103 to **Claussen-Lawrence Construction Co.**, of Augusta, **W. L. Cobb Construction Co.**, of Decatur, and **Coffee Construction Co.**, of Eastman; $207,612 to **Scott Construction Co.**, of Thomasville; $364,548 to **Hugh McMath Construction Co.**, of Columbus. Iowa: $279,386 to **Fred Carlson Co.**, of Decorah; $281,036 to **McCarthy Improvement Co.**, of Davenport. Illinois: $581,737 to **Milburn Bros., Inc.**, of Mount Prospect; $371,229 to **General Paving Co.**, of Champaign; $284,955 to **Municipal Paving Co.**, of Cicero. Mississippi: $901,454 to **Shuptrine Construction Co.**, of Hattiesburg. Michigan: $513,023 to **Bridgeport Core Sand Co.**, of Saginaw; $376,498 to **Taylor Bros. Co., Inc.**, of Birmingham. Nebraska: $771,137 to **Watt & Moran**, of Omaha; $2,700,931 to **Abel Construction Co.**, and **Dobson & Robinson Construction Co.**, both of Lincoln; $504,703 to **G. H. Lowe** and **R. Green**, of Cedar Rapids, Ia.; $1,000,000 to **Inland Construction Co.**, of Omaha. $282,775 to **W. H. Noel Co.**, of Jamestown. Nevada: $509,662 to **Wallace & Wallace**, of Phoenix, Ariz. North Carolina: $229,003 to **B. H. Martin**, of Easley, S. C. Oregon: $546,125 to **Parker-Schram Co.**, of Portland; Oklahoma: $539,706 to **Standard Paving Co.**, of Tulsa. Ohio: $572,085 to **Contractors Construction Co.**, of Cincinnati. Pennsylvania: $1,511,438 to **Hinman Bros. Construction Co.**, of Pittsburgh. Wisconsin: $540,221 to **N. M. Isabella**, of Madison. Washington: $1,179,043 to **Leonard & Slate**, of Multnomah, Ore.

JUNE, 1942

Copyright, 1942 — Established 1919

McGraw-Hill Publishing Co., Inc.
330 West 42nd St., New York

Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

JOHN ABBINK, Publisher
ROBERT K. TOMLIN, Editor — A. E. PAXTON, Manager
Editorial Staff: Vincent B. Smith, Paul Wooton (Washington)
N. A. Bowers (San Francisco) Nelle Fitzgerald

A McGRAW-HILL PUBLICATION

The HOW of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

CONSTRUCTION METHODS, June, 1942. Volume 24, Number 6. Published Monthly, price 20¢ a copy. Allow at least ten days for change of address. All communications about subscriptions should be addressed to the Director of Circulation, 330 West 42nd Street, New York, N. Y. **Subscription rates**—United States, Mexico and Central and South American countries, $1.00 a year, $1.50 for two years, $2.00 for three years. Canada, $1.50 a year, $2.50 for two years, $3.00 for three years. Great Britain and British Possessions 12 shillings a year, 36 shillings for three years. All other countries $2.00 a year, $6.00 for three years. Entered (or reentered) as second class matter December 16, 1936, at the Post Office at New York, N. Y., U. S. A., under the act of March 3rd, 1879. Printed in U. S. A. Cable address: "McGrawhill, New York." Member of A. B. P. Member of A. B. C. Contents copyrighted 1942 by McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York, N. Y.

McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42d STREET, NEW YORK, N. Y.

JAMES H. McGRAW, Founder and Honorary Chairman

Editorial and Publishing Offices: 330 West 42nd St., New York; 520 North Michigan Ave., Chicago; 68 Post St., San Francisco; Aldwych House, London, W. C. 2, England. Branch Offices: Washington; Philadelphia; Cleveland; Detroit; St. Louis, Boston, Los Angeles; Atlanta, Ga.

JAMES H. McGRAW, Jr., President — **HOWARD EHRLICH**, Executive Vice-President — **MASON BRITTON**, Vice-President — **B. R. PUTNAM**, Treasurer — **JOSEPH A. GERARDI**, Secretary — **J. E. BLACKBURN**, Circulation Manager

THE JOB JESTER

CARTOONS DRAWN FOR CONSTRUCTION METHODS

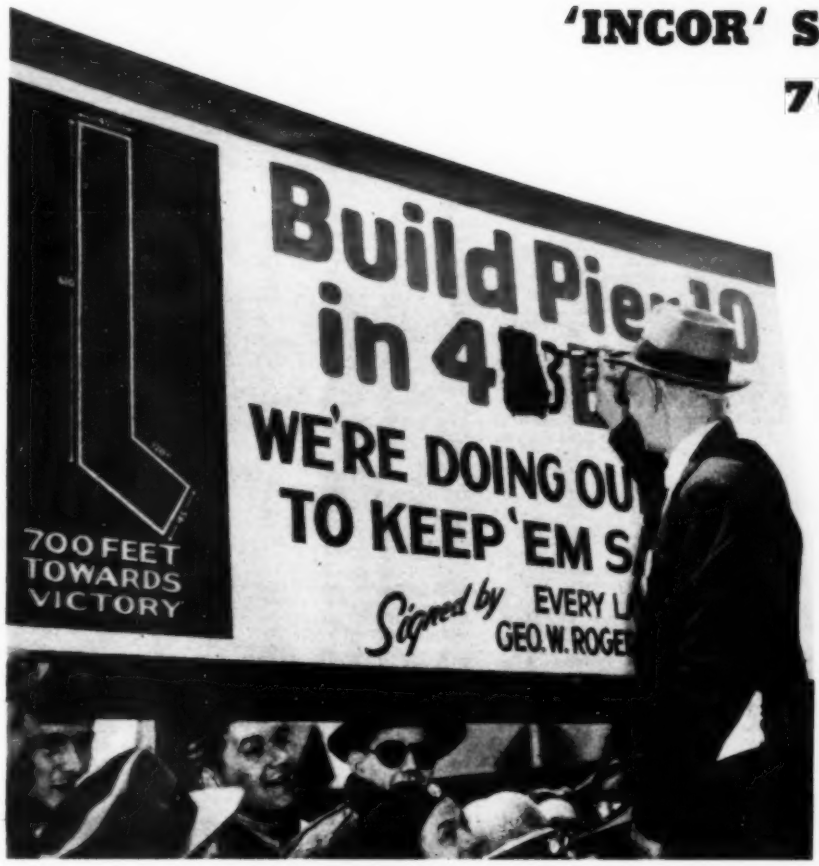
"Casey always stops riveting when DiMaggio comes to bat."

"He's building an air castle—that's the only building material Washington will let him have."

"It's hard to say when we'll get new equipment, so I figured we had better save the tires!"

90-DAY PIER JOB BUILT IN 43 DAYS

'INCOR' SPEEDS CONCRETING ON 700-FT. NAVY PROJECT



Foreman of George W. Rogers Construction Co. paints a "3" over the "5" on sign at pier site—signalizing completion 2 days ahead of the 45-day schedule for a 90-day job! Below, left, pier before completion; right, placing 'Incor' concrete at night.

CONTRACT for 700-ft. Navy pier for Bethlehem Steel Corporation called for 90-day completion. Then came the Navy's order to "double shift it." This meant a 30-day saving—but the pier was needed even quicker than that. So George W. Rogers Construction Co., New York, re-scheduled every detail of the job and came up with an estimated figure of 45 days.

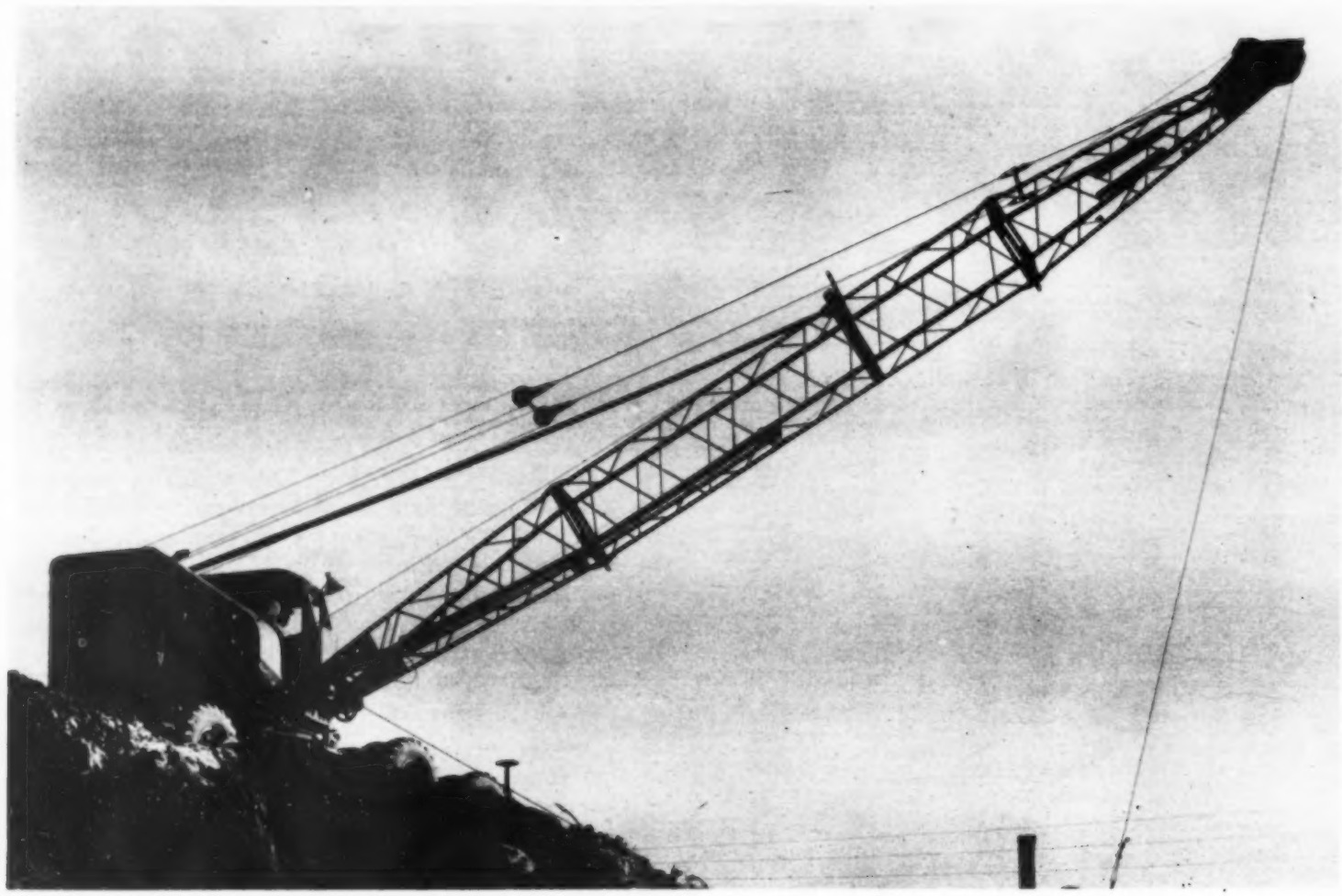
Scant time, indeed, in which to drive 42,700 ft. of piling, frame 200,000 board feet of creosoted timber, and place 22,700 sq. ft. of concrete deck—in late winter sleet and fog. Good job planning, teamwork between management and men—and 'Incor'* concrete, placed one day, carrying cranes and heavy equipment the next—did the trick.

As George W. Rogers, President of the Contracting firm, puts it: "When it came to concreting, my worries were over—as a confirmed 'Incor' user I knew I could rely on it to get the job finished on time—or sooner. In fact, this job was turned over to the Navy *in the record time of 43 days!*" *Reg. U.S. Pat. Off.

Time Won't Wait . . . Use 'Incor'

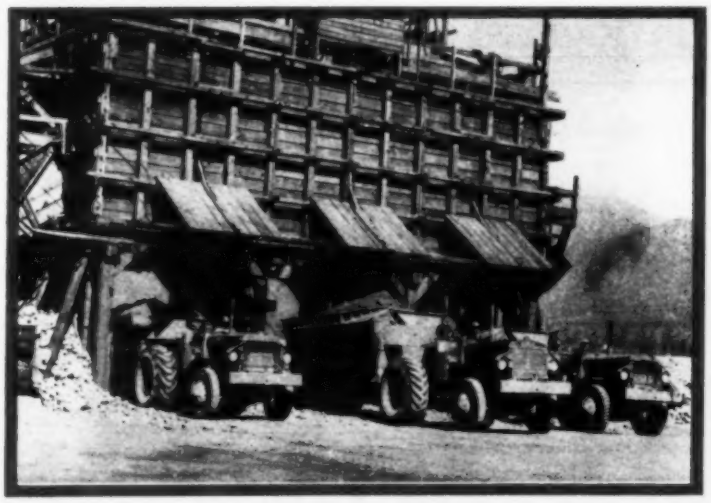
LONE STAR CEMENT CORPORATION

Offices: ALBANY • BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON • INDIANAPOLIS • JACKSON, MISS. KANSAS CITY • NEW ORLEANS • NEW YORK • NORFOLK • PHILADELPHIA • ST. LOUIS • WASHINGTON, D. C.



WHEN TIME IS SHORT

Performance is doubly important!



● Contractors and engineers always have to "work against time", but today's problems call for even greater speed and performance. We've simply got to get huge jobs done faster than ever so that it will not be too late—not only for our immediate needs, but for the America of tomorrow.

Euclid Self-Powered Hauling equipment is today helping to set new records in the construction of essential installations for our own government and industries as well as for those nations who are joined with us in the biggest job we've ever had. Day after day Euclids are hauling bigger loads faster on all kinds of jobs —and they're doing it with less time out for servicing and repairs. That's the kind of performance that's built into every Euclid, and it's one of the reasons why contractors depend on Euclids for the big rush jobs.

When repair parts are needed to keep Euclids rolling at peak performance, there are factory parts depots in Cleveland, Memphis, Hibbing and San Francisco, and Euclid distributors in every section of the country are ready and able to serve you efficiently.

The EUCLID ROAD MACHINERY Co. • Cleveland, Ohio

EUCLID SELF-POWERED HAULING EQUIPMENT For EARTH . . ROCK . . COAL . . ORE

CRAWLER WAGONS - ROTARY SCRAPERS - TAMPING ROLLERS

To Save Vital

BLAW-KNOX PRE

TO THE CONSTRUC

THIS NATIONALLY KNOWN DISTRIBUTING ORGANIZATION WILL MAKE THE PLAN EFFECTIVE

ALABAMA
Birmingham — Young & Vann Supply Company

ARIZONA
Phoenix — State Tractor Equipment Company

ARKANSAS
Little Rock — Lyons Machinery Company

CALIFORNIA
Los Angeles — LeRoi-Rix Machinery Company
Los Angeles — E. M. Ornitz
San Francisco — C. H. Grant Company

COLORADO
Denver — Ray Corson Machinery Company

CONNECTICUT
New Haven — The W. I. Clark Company

DELAWARE
Baltimore, Md. — Henry H. Meyer Company, Inc.

DISTRICT OF COLUMBIA
Washington — Matt A. Doetsch Machinery Company

FLORIDA
Jacksonville — Quinn R. Barton, Inc.
Marianna — Berry & Brown, Inc.
Miami — East Coast Equipment Company, Inc.
Tampa — Epperson & Company

GEORGIA
Atlanta — W. C. Caye & Company

IDAHO
Boise — Intermountain Equipment Company

ILLINOIS
Chicago — O. T. Christerson Company
St. Louis, Mo. — O. B. Avery Company

INDIANA
Indianapolis — Reid-Holcomb Company

IOWA
Davenport — Gierke-Robinson Company
Des Moines — Herman M. Brown Company

KANSAS
Kansas City, Mo. — G. W. Van Keppel Company

KENTUCKY
Louisville — Brandeis Machinery & Supply Company

LOUISIANA
New Orleans — Southern States Equipment Company

MAINE
Portland — Stanley & Cadigan Company

MARYLAND
Baltimore — Henry H. Meyer Company, Inc.

MASSACHUSETTS
Boston — The Equipment Company
New Haven, Conn. — The W. I. Clark Company

MICHIGAN
Detroit — Wm. P. Favorite Company
Grand Rapids — Contractors Machinery Company
Iron Mountain — Service & Supply Division

MINNESOTA
St. Paul — Borchert-Ingersoll Company

MISSISSIPPI
Amory — Dalrymple Equipment Company

MISSOURI
Kansas City — G. W. Van Keppel Company
St. Louis — O. B. Avery Company

MONTANA
Billings — Western Construction Equipment Company

NEBRASKA
Omaha — Anderson Equipment Company

NEVADA
Los Angeles, Calif. — E. M. Ornitz
San Francisco, Calif. — C. H. Grant Company

NEW HAMPSHIRE
Barre, Vermont — Cassellini-Venable Corporation
Boston, Mass. — The Equipment Company
Portland, Maine — Stanley & Cadigan Company

NEW JERSEY
New York, N.Y. — R. E. Brooks Company
Philadelphia, Pa. — Giles & Ransome

NEW MEXICO
Albuquerque — Power Equipment Company

NEW YORK
Albany — Larkin Equipment Company
Buffalo — Trevor Corporation
New York — R. E. Brooks Company

NORTH CAROLINA
Raleigh — Carolina Tractor & Equipment Company
Salisbury — Carolina Tractor & Equipment Company

NORTH DAKOTA
Fargo — Dakota Tractor & Equipment Company

OHIO
Cleveland — H. B. Fuller Equipment Company
Columbus — W. W. Williams Company
Cincinnati — W. W. Williams Company

OKLAHOMA
Oklahoma City — Leland Equipment Company
Tulsa — Leland Equipment Company

OREGON
Portland — Contractors Equipment Corporation

PENNSYLVANIA
Harrisburg — Dravo-Doyle Company
Philadelphia — Giles & Ransome
Pittsburgh — Dravo-Doyle Company

RHODE ISLAND
New Haven, Conn. — The W. I. Clark Company

SOUTH CAROLINA
Columbia — Jeff Hunt Road Machinery Company

TENNESSEE
Chattanooga — Nixon-Hasselle Company
Knoxville — Wilson-Weesner-Wilkinson Company
Nashville — Wilson-Weesner-Wilkinson Company

TEXAS
Dallas — Conley-Lott-Nichols Machinery Company
Houston — R. B. Everett & Company
San Antonio — Cochran Equipment Company

UTAH
Salt Lake City — Lund Machinery Company

VERMONT
Barre — Cassellini-Venable Corporation

VIRGINIA
Roanoke, Roanoke Tractor & Equipment Corporation
Richmond, Roanoke Tractor & Equipment Corporation

WASHINGTON
Seattle — L. A. Snow Company
Spokane — Empire Equipment Company

WEST VIRGINIA
Charleston, Charleston Tractor & Equip. Corporation
Clarksburg, Charleston Tractor & Equip. Corporation

WISCONSIN
Milwaukee — Hunter Tractor & Machinery Company

WYOMING
Billings, Mont., Western Construction Equip. Company
Denver, Col. — Ray Corson Machinery Company

CLEARING HOUSE FOR

CONCRETE SPREADERS · ROAD FORMS
CONCRETE FINISHING MACHINES · BINS AND BATCHERS
BULK CEMENT PLANTS · CENTRAL MIXING PLANTS

l War Materials

RESENTS A PLAN
CTION INDUSTRY

...the plan...

Blaw-Knox Company, through its offices and its sixty-five distributors, is establishing a national clearing house for used construction machinery of the types listed below which may be utilized for war construction.

Contractors having idle equipment and those in need of such equipment for war construction are invited to communicate with the nearest Blaw-Knox Distributor or with the Company direct, giving details including selling or rental prices.

The Company will then place the seller and buyer in contact with each other through their respective Blaw-Knox Distributors. The Blaw-Knox Company will not enter into the transaction beyond this point as it is interested only in serving to the greatest extent possible in the conservation of vitally needed war materials.

Because our widespread organization is expert in the distribution and servicing of construction machinery, there will be further assurance that equipment at present available will be placed in use where needed on war work. This plan should result in a decided saving of critical materials otherwise used in the manufacture of new equipment.

Naturally, the Blaw-Knox Company will continue to manufacture new equipment to the extent that Government Authorities deem necessary for vital construction.

BLAW-KNOX DIVISION OF BLAW-KNOX COMPANY
Farmers Bank Building Pittsburgh, Pennsylvania

NEW YORK—Canadian Pacific Building · CHICAGO—Peoples Gas Building
PHILADELPHIA—Broad Street Station Building · BIRMINGHAM—Brown-Marx Building

Representatives throughout the country

CLEARING HOUSE FOR

TRUCK MIXERS · CLAMSHELL BUCKETS
CONCRETE BUCKETS · STEEL STREET FORMS
TRUCK TURNTABLES · TAMPING ROLLERS

You Expected to Read This NEXT YEAR!

Industry after industry is beating its promise as America's war production sets new world's records . . . Management, labor, W. P. B., Army, Navy, the Maritime Commission and other government departments are cooperating to make next year's headlines come true THIS year.

In World War I, the Kaiser feared American manpower. In World War II, Hitler is even more fearful of our rapid transition from peace to war production. . . . He has reason to be afraid.

Printing press factories are exceeding quotas on anti-aircraft gun parts.

Spark plug manufacturers are setting new speed records in machine gun production.

The heavy-transportation industry is making giant chassis for big guns at a faster rate than all the Axis powers combined.

In this industry, men who used to make locomotives and tractors are changing "Too Little and too Late" to read "Too Much and too Soon," from the enemy's viewpoint.

Starting just a few months ago, with a bale of blueprints and a knowledge of how to build such things as road-scrapers, power-shovels and trucks, the heavy-transportation industry is turning out mobile artillery that will shake the earth in more than a literal sense.

The story of how this industry joined the army carries a significance which should be understood and remembered.

The significance is that America has solved the problem of exchanging production techniques between specialized industries. This process went on unnoticed in peacetime. War gave it prominence.

▶When the bales of blueprints were first delivered, and the heavy-transportation industry started on its job of producing prime-movers and chassis for big guns in quantity, new production techniques were needed in a hurry.

▶Here are some of the questions that arose:

"How do you weld such heavy subassemblies?"

"What welding fixtures will handle these parts so that our workmen can always weld down-hand?"

"How can we make these long, heavy welds and have sound metal from one end to the other?"

"What's the best technique for testing welded parts? Shall we x-ray, or use the magnaflux process?"

"What's the best way to support these welded assemblies for machining?"

That's just a few of the thousands of questions that arose in the minds of experienced men when they had to solve new problems.

They illustrate the fact that American production methods depend upon specialized techniques and machines.

Each man with such a problem knew that someone, somewhere, had solved his problem, or might solve it before he could work out his own answer.

Therefore he turned to the source of industrial information he had always used when he wanted to know what others were doing . . . his industrial magazine.

Ever since the Maginot Line was flanked, the Industrial Press of America has been helping rookie industries to become veterans in the battle of war production.

▶It doesn't do this by exhortation or command, but by answering thousands of specific questions.

Just as newspapers keep their war correspondents at the front, Industrial Magazines keep their "war-production-correspondents" in the plants where weapons and equipment are made.

McGraw-Hill editors are mobilized for war as literally as though they were firing weapons instead of helping to produce them. More than 90% of the time of McGraw-Hill's 153 editors and 725 engineer-correspondents is devoted either to visiting war-production plants (to study production techniques) or in writing "war stories" on how production problems were solved.

"Know-how" is the secret of the amazing records now being made by American Industry. And "know-how" comes from thousands of "little facts" like this:

Information on tool shapes for cutting the harder steels of war is vital literature to the engineer, designer or production man with the particular problem of cutting those steels confronting him.

The industrial editor does not work alone in giving vital information to men on the production line. In much the same way, manufacturers are war-converting their industrial advertising to show their readers how to use their products more effectively. For instance:

A business-paper advertisement showing how to make old taps and dies last longer has no glamour for anyone but the man who must rush production with an inadequate supply of new ones. To him it has enough "oomph" to be clipped and placed on his office wall.

To the casual observer, the Industrial Press is about as exciting as the rows of wires that stretch along every road and railway. . . . The simile is very apt. Both exist solely for the interchange of ideas. Both are typically American in the extent to which they have been developed and applied to the whole economy. . . . *This advertisement published by the McGraw-Hill Network of Industrial Communication.*

• • •

THE McGRAW-HILL NETWORK

23 PUBLICATIONS WHICH HELP MORE THAN 1,000,000 EXECUTIVES, DESIGNERS AND PRODUCTION MEN TO EXCHANGE IDEAS ON WAR-PRODUCTION PROBLEMS

American Machinist • Aviation • Bus Transportation Business Week • Chemical & Metallurgical Engineering Coal Age • Construction Methods • Electrical Contracting • Electrical Merchandising • Electrical West Electrical World • Electronics • Engineering & Mining Journal • E. & M. J. Metal and Mineral Markets • Engineering News Record • Factory Management & Maintenance • Food Industries • Mill Supplies • Power Product Engineering • Textile World • Transit Journal Wholesaler's Salesman. Also publishers of thousands of books for technical and engineering schools and colleges, as well as for general business use.

McGRAW-HILL PUBLISHING COMPANY, INC.
330 WEST 42nd STREET, NEW YORK

OSHKOSH 4-WHEEL DRIVE

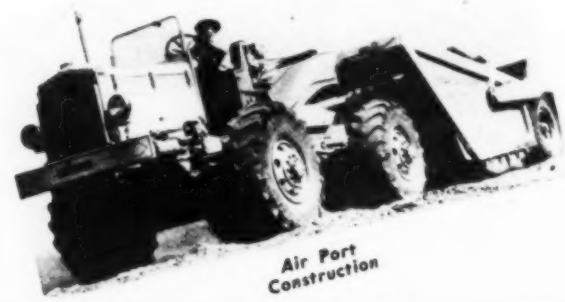
An 8-ton Oshkosh speeding construction on Presque Isle Air Base

ON DEFENSE SERVICE AT HOME AND ABROAD

Designed for hauling heavy guns and equipment

Fire fighting—204 Horsepower Thousand Gallon Pumper

Snow removal for Air Ports and Defense Highways



Air Port Construction

For twenty-four years Oshkosh has been building 4-Wheel Drive trucks for all kinds of jobs where the going was tough. Their dependability has long been recognized by Federal, State and County Highway Departments.

Recently an increasing number of Oshkosh trucks have gone into National Defense service, in and outside of the United States.

If you need dependable trucks for hard work, investigate OSHKOSH.

- **Shock-proof Steering. Easy Driving**
- **Simple Design. Low Upkeep**
- **Heavy Double Reduction Axles**
- **Large Roomy Air-Conditioned Cab**
- **Complete Range—2 to 12 ton capacity**
- **Automatic Locking Center Differential**

Service stations at convenient points throughout the U.S.

Write for descriptive bulletin

OSHKOSH 4-WHEEL DRIVE SALES AGENCY

OSHKOSH, WISCONSIN, CABLE ADDRESS, "OSHMOTOR" OSHKOSH

Exclusive Sales Agency for Oshkosh Trucks and Tractors.

HAULING JEEPS ACROSS RAVINES

Another Job for Wickwire Rope

There are many *extra* jobs that wire rope must do today. The Army, the Navy, and the Liberty Fleet need vast quantities of wire rope.

This points up the message: MAKE YOUR WIRE ROPE LAST LONGER.

When wire rope fails too soon, it wastes badly needed steel, labor and time. If by care you can make *your* wire rope last longer, you are helping to win the war.

When you *do* need wire rope, be sure to get the correct type and size for your service. Our representatives will help you determine the best Wickwire Rope, preformed or Wissco lay, for your use—and after installation will help you get longest life and most economical operation from it.

The reason for the long life of *Wickwire* rope lies in our controlled production, every step of the way from ore pile, to blast furnace, to open hearth, to finished rope.

• • •

Have you a copy of the book "Know Your Ropes"? It will help *you* get longer rope life. More than 25,000 wire rope users all over the world regard it as the authoritative guide to wire rope economy. For your free copy, write Wickwire Spencer Steel Company, 500 Fifth Avenue, New York, N. Y.

WHEN WIRE ROPE LEAVES ITS IMPRINT in sheave or drum groove, there is a filing action on the rope at every start and stop. Grooves having the slightest impressions should be machined and polished. This and forty more rope life-savers are pictured and described in "Know Your Ropes."

SEND YOUR WIRE ROPE QUESTIONS TO WICKWIRE SPENCER

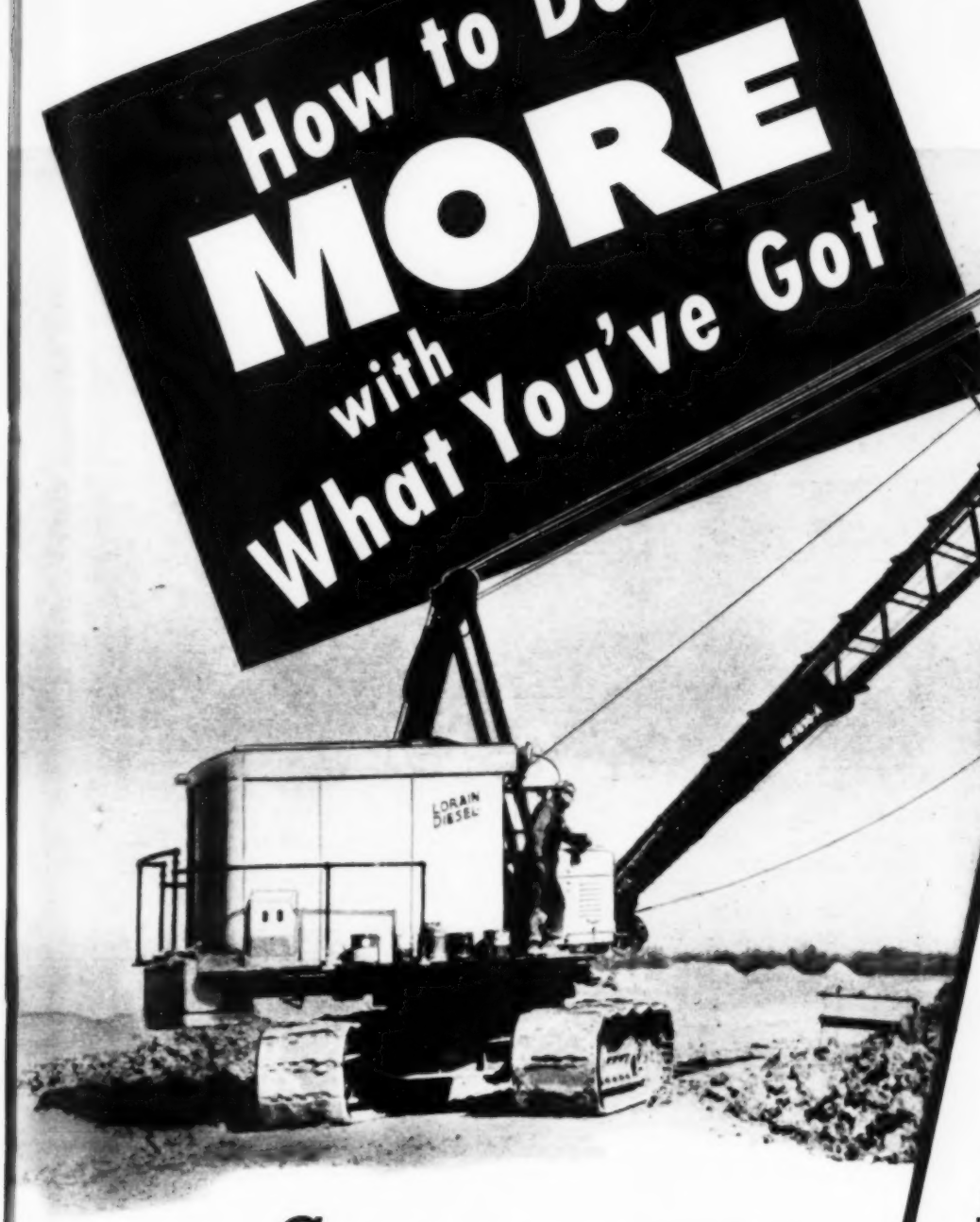
WICKWIRE SPENCER STEEL COMPANY

WICKWIRE ROPE

Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City

WISSCO PRODUCTS

How to Do MORE with What You've Got



use LORAIN "Distributor Service"

You can reduce maintenance expense and make your equipment last longer by taking advantage of these definite services and facilities which your Thew-Lorain distributor offers. Try 'em, and you'll keep 'em digging and swinging—faster, and at lower cost.

- In many cases your distributor maintains a representative stock of genuine Thew-Lorain spare parts and can give you quicker service on deliveries because he knows *what you need* and *how to get it* if he doesn't have it in stock.
- He is equipped in most cases to provide quick service *in the field*, and at his shop he maintains complete facilities where the toughest repair jobs can be handled.
- He *knows* Thew-Lorain equipment thoroughly—employs service men who are experienced in repair and maintenance work on Lorain shovels and cranes. He can help you plan your jobs so that your equipment will deliver the greatest work in the shortest time.
- He may be able to supply information on rentable equipment or booms that you may need for converting present machines.

Contractors today are faced with a new problem. Where formerly new equipment and most spare parts could be obtained on relatively short notice, now the needs of war sometimes cause delivery delays and even shortages.

Let's face the facts—we're all willing to sacrifice if it will help our victory efforts. For many owners of older Lorain equipment, it means making your present equipment last longer and getting the *most* out of what you've got.

The Thew-Lorain distributor in your locality can help you. Call on him often—for advice—for service—for parts replacement. His biggest job today is to help you get your jobs done on time.

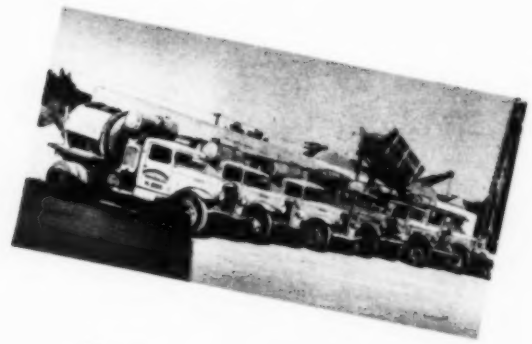
The Thew Shovel Company
Lorain, Ohio

THEW CENTER DRIVE

THEW-LORAIN

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

ENGINES STAY *3 Times Cleaner* INSIDE



Truck fleet of the Standard Roofing and Material Co., Tulsa, Okla. This company's equipment has been Texaco fueled and lubricated throughout . . . for 15 years.

THEY PREFER TEXACO

- ★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.
- ★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.
- ★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.
- ★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.
- ★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

FOR YOUR ENJOYMENT
FRED ALLEN every Sunday night. See your local newspaper for time and station.

THOUSANDS of extra miles of wartime service can be yours, beginning now, when your high-speed Diesels and heavy-duty gasoline engines are lubricated with *Texaco Ursa Oil X* ***

*Texaco Ursa Oil X*** keeps engines three times cleaner than ordinary oils. Deposit-forming materials are held in suspension so that they are drained at regular oil-change periods. Oil lines, oil ways and filters stay clean.

Give Love your Car Lose your Country

High in E. P. characteristics, *Texaco Ursa Oil X*** makes heavy-duty engines last longer; protects modern bearings.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has made it preferred on prominent construction jobs throughout the country.

A Texaco Automotive Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distribution points in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York, N. Y.

TEXACO

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

BUYING A TRUCK MIXER? Consider This!

The truck mixer you want is the one that will stay on your payroll a long time—whose design is such that it won't face early obsolescence and inability to compete on a par with other truck mixers of a year or five years from now. We say that such a truck mixer is the Rex Hi-Discharge Moto-Mixer—and offer this as evidence:

WHEN you're buying a truck mixer, remember that Rex is the truck mixer which offers a mixing drum with the only true end-to-end, self-cleaning mixing action. And the Rex mixing drum is proof against "balling" or "dry coring."

Rex is the truck mixer which offers an end-charging design that has been proved, perfected and unchanged during the past two years.

Finally, Rex is the truck mixer which offers a simple, accurate water system—one that is fully protected against freezing!

There are other reasons why you stand to gain by buying Rex—the one high discharge truck mixer that is driven by the shock-absorbing Rex chain belt drive!

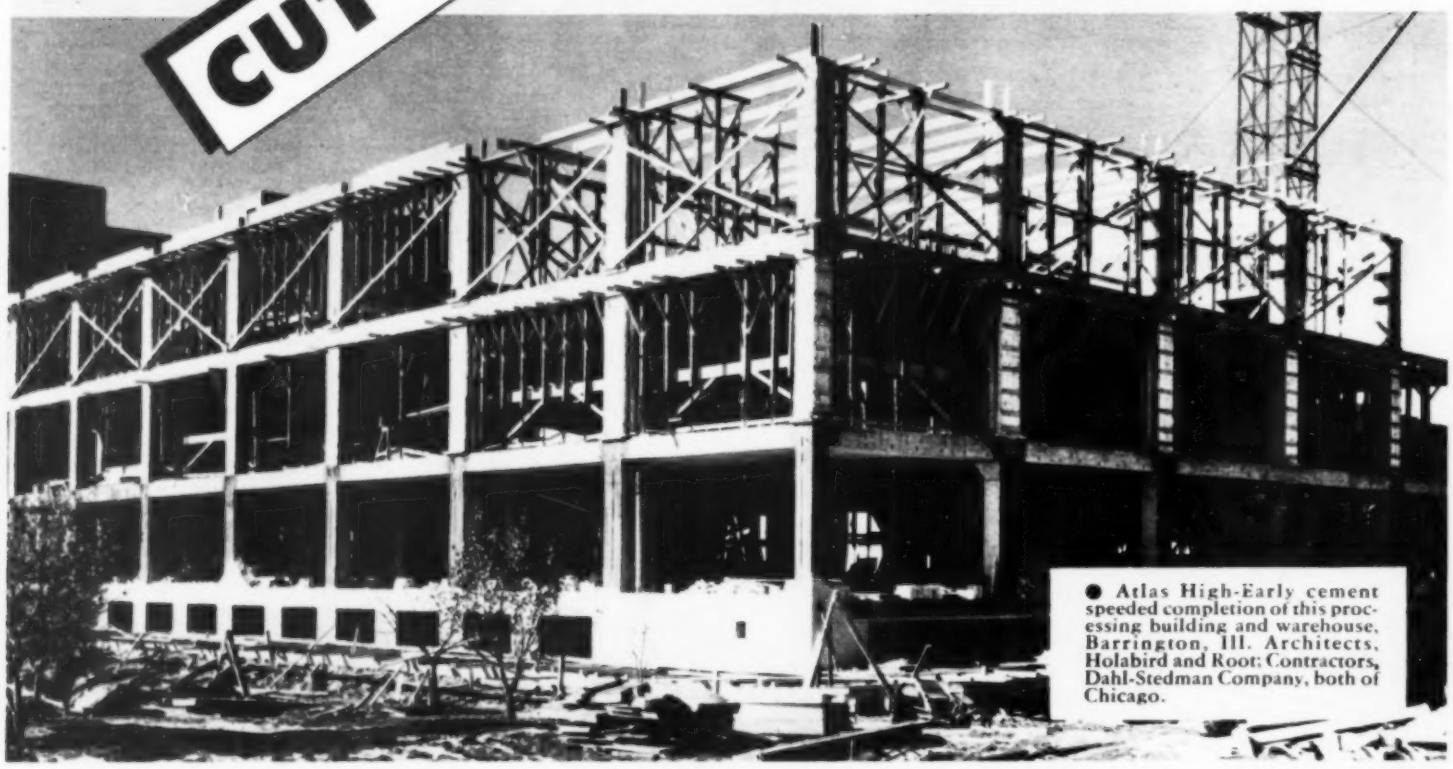
You'll find these reasons in the new catalog "Proved Performance from Coast to Coast." For your copy, address Chain Belt Company, 1664 West Bruce Street, Milwaukee, Wisconsin.

REX **MOTO-MIXERS**

HI-DISCHARGE AND HORIZONTAL TYPES

CHAIN BELT COMPANY OF MILWAUKEE

TIME FOR COMPLETION CUT IN HALF! NUMBER OF FORMS USED COST OF FORM LUMBER



● Atlas High-Early cement speeded completion of this processing building and warehouse, Barrington, Ill. Architects, Holabird and Root; Contractors, Dahl-Stedman Company, both of Chicago.

Atlas High-Early cement used on three-story warehouse helped save time, labor and cost!

PLANS called for three-story concrete frame warehouse with concrete floor slabs. Dahl-Stedman Company, the contractors, specified Atlas High-Early cement and *saved in these ways:*

THEY SAVED TIME. The superintendent states that Atlas High-Early cement cut the time for completion of this project approximately 50%.

THEY SAVED FORMS. By using Atlas High-Early cement, they were able to strip forms in from three to four days. With regular portland cement it would have been necessary to wait about seven or eight days before forms could be stripped. This made possible a 50% saving in forms and form lumber.

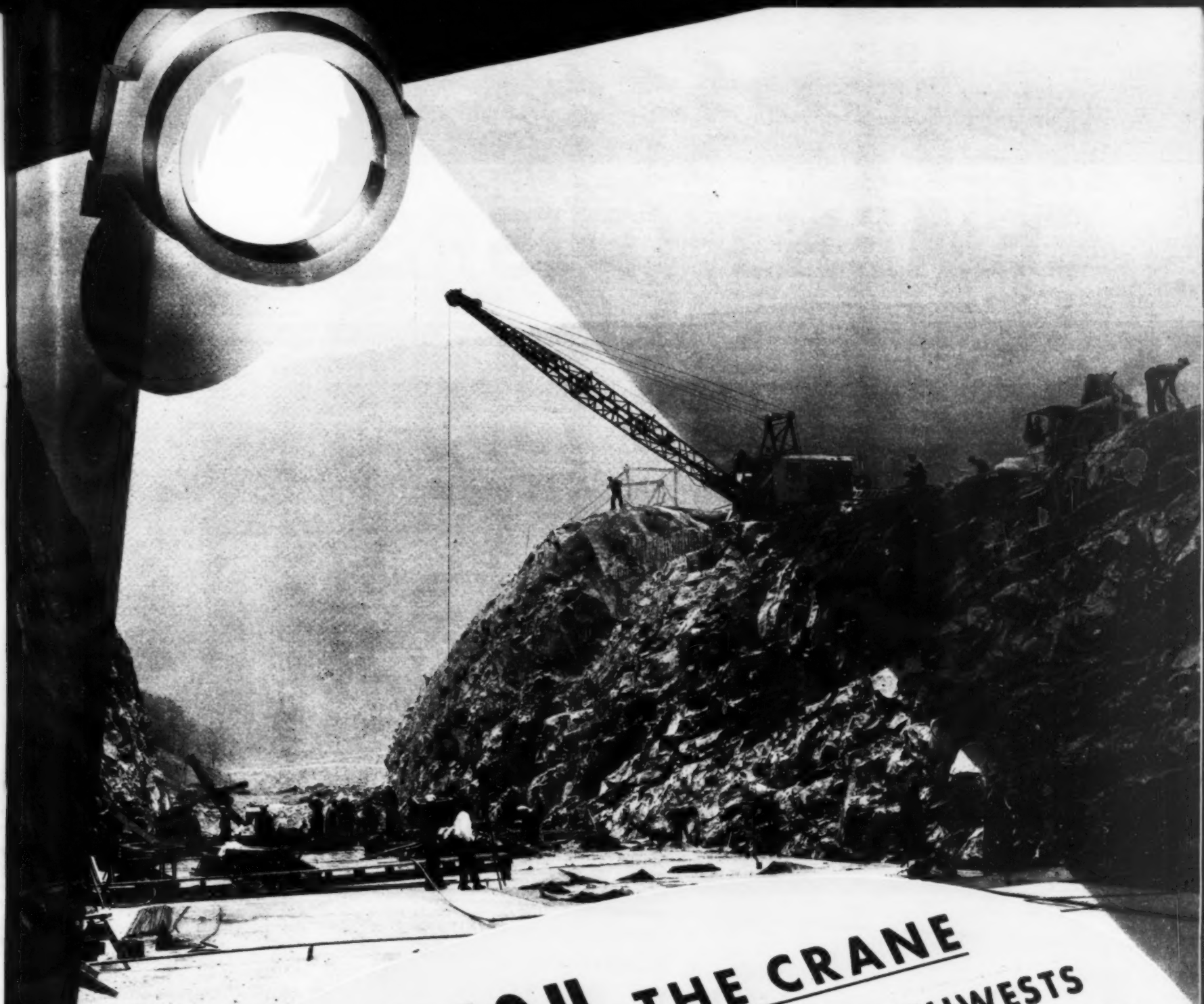
Atlas High-Early cement can save time and dollars for you . . . Atlas High-Early cement gains working strength rapidly—often cuts time for protection and curing as much as 60% to 70%. In many cases it permits early stripping of forms for re-use and results in a substantial saving in form costs. Atlas High-Early cement also more than pays for its slight extra cost on many jobs. It will pay you to consider it for *your* next job. Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York City.

OFFICES: *New York, Chicago, Philadelphia, Boston, Albany, Pittsburgh, Cleveland, Minneapolis, Duluth, Kansas City, St. Louis, Des Moines, Birmingham, Waco.*

CM-H-43

ATLAS HIGH-EARLY CEMENT

A UNIVERSAL ATLAS PRODUCT



WATCH THE CRANE PERFORMANCE

ARE GIVING ON EMERGENCY JOBS TODAY THAT NORTHWESTS AND YOU'LL BE CONVINCED THAT NORTHWEST IS THE MACHINE FOR SUCCESSFUL CONTRACTS TOMORROW!

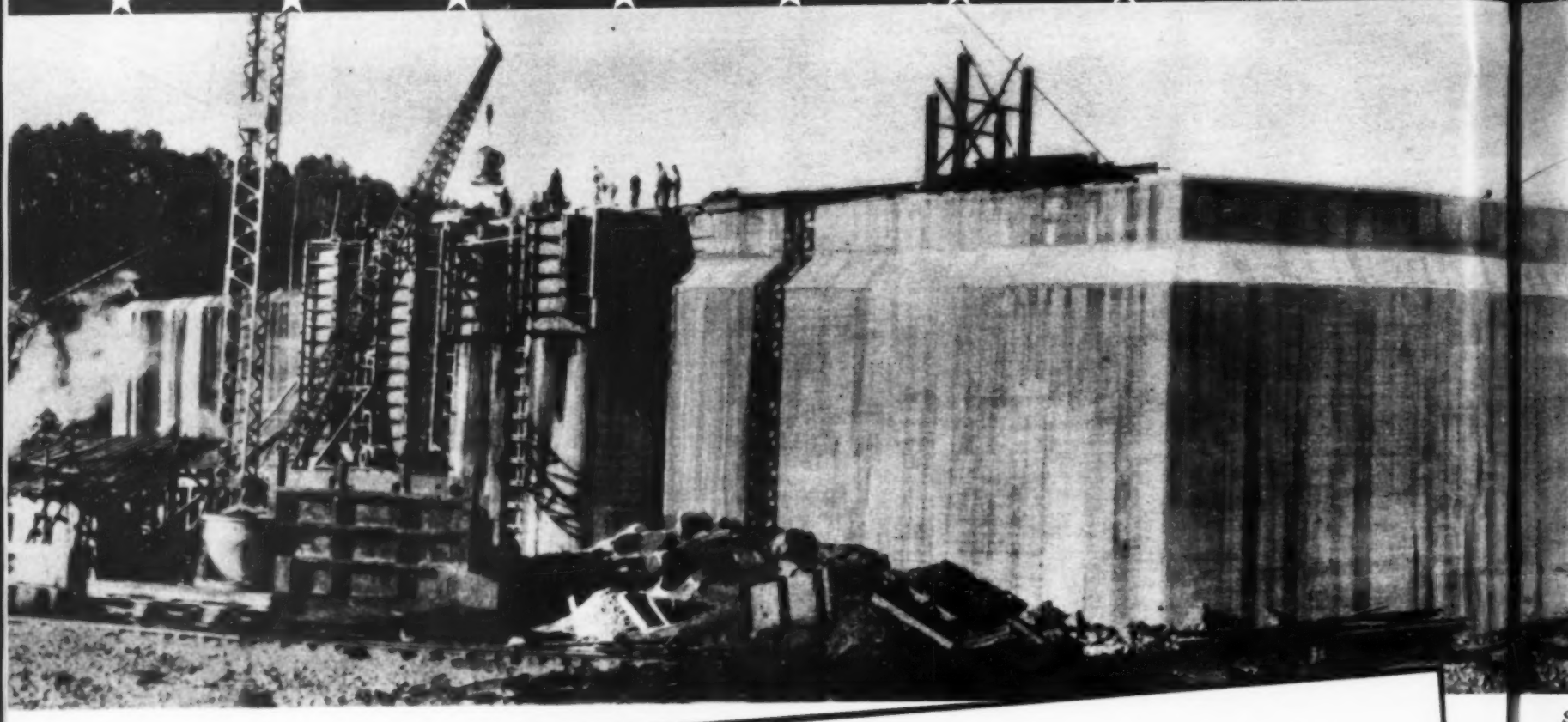
NORTHWEST

Shovels • Cranes • Draglines • Pullshovels

.... If it's a real Rock Shovel you won't have to worry about output in dirt!

Building Power

CEMENT DISPERSION



IN the nation's drive to utilize all available power to speed the war program, engineers and contractors are tapping heretofore unused power in cement, through Cement Dispersion.

Cement Dispersion makes available a far greater percentage of the latent power in all portland cement, which increases the speed of concrete construction and brings about substantial savings. (See explanation to right, "How Cement Dispersion Works.")

Because Cement Dispersion utilizes more of the cement, speed of construction can be increased by reducing heat evolution and adding durability through reduced cracking.

More and more engineers and contractors are meeting the following concrete requirements by using Cement Dispersion: speed, strength, workability, placeability, water-tightness and durability.

Information on Cement Dispersion can be extremely important to every engineer, architect, contractor and owner. Write for the story on Pozzolith today.

THE MASTER BUILDERS COMPANY, LTD.

TORONTO MONTREAL

In the U. S. A.: The Master Builders Company, Cleveland, Ohio

MASTER BUILDERS

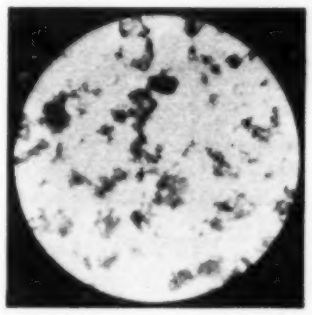
MASTERBUILT PRODUCTS

for Victory...

PROVES VITAL AID

Speeding construction of this great power dam, located in Canada, was an important factor in the decision to use Pozzolith throughout. Contractors—The Foundation Company, Ltd., Montreal, Quebec.

HOW CEMENT DISPERSION WORKS



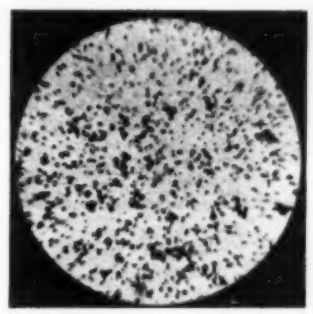
Cement suspended in water
UNDISPERSED

WITHOUT POZZOLITH

In a normal concrete mix, cement particles tend to bunch together, thereby (1) limiting hydration and (2) trapping water within the cement clumps. (See photomicrograph above).

Only a part of the cementitious value of the cement, whether normal portland or high early, is utilized under usual construction conditions. Investigation shows that with 28 days curing only 50% hydrates. [Anderegg and Hubbell, A. S. T. M. 29 II 554 (1929)].

Dispersed cement produces 25% to 40% higher compressive strengths.



Cement suspended in water
DISPERSED

WITH POZZOLITH

Cement Dispersion drives these particles apart and (1) exposes their entire surface area to hydration, at the same time (2) making the water entrapped in the clumps available for lubrication of the mix. (See photomicrograph above).

NATION'S IMPORTANT INDUSTRIES UTILIZE DISPERSION

Dispersion, now successfully applied to cement through Pozzolith, is responsible for essential properties in:

STEEL
PAINT
RUBBER
PLASTICS
GRAPHITE
CERAMICS
PRINTING INK

and other basic products.

CEMENT DISPERSION IS HELPING TO BUILD *FASTER*, ALL TYPES OF WAR POWER

WAR-TIME HELP FOR FLEET OPERATORS

• TODAY as never before, fleet operators are interested in preventive maintenance. More service and longer life from each unit is the order of the day in a nation which means business in winning the war.

No group is better qualified by education and experience to help operators gain these ends than is the Standard Automotive Engineering staff. These men have tackled every phase of the problem, from cost accounting to shop practice. Here's an example of how their advice helped solve one problem in fleet conservation.

Sludge formation in the equipment of the Kalamazoo Creamery pictured above was troublesome. Engines required frequent cleaning. This meant needed equipment taken out of service — high part replacements. Here's a quick view of what an Engineer found and did:

- **Engines idling large part of time.**
- **Frequent starting and stopping.**
- **Discussed engine adjustments to meet conditions.**
- **Demonstrated how adjustments could be accurately maintained with instruments.**
- **Advised chief mechanic in use of instruments (purchased by fleet).**
- **Suggested methods for preventive maintenance.**
- **RESULTS—Sludging eliminated. Big savings in parts, labor, and oil. Gasoline mileage increased up to 20% per unit.**

Sludging may not be your trouble, but the same basic problem confronts you—more service and longer life. There are seven ways listed below in which Standard's Fleet Conservation Service may help you. Just write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois. Ask to have an Automotive Engineer explain this service fully. In Nebraska, write Standard Oil Company of Nebraska at Omaha.

OIL IS AMMUNITION...USE IT WISELY

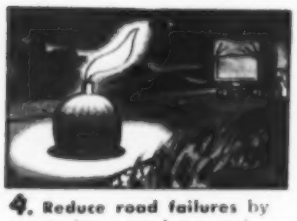
STANDARD OIL'S
FLEET CONSERVATION SERVICE

Standard Automotive Engineers can help you . . .

1. Locate high maintenance items by suggesting practical cost accounting records.

2. Promote longer ring and piston life by determining safe oil drain periods.

3. Lengthen valve and ignition system life by scientifically determining engine adjustments.



4. Reduce road failures by suggesting proved preventive maintenance methods.

5. Increase wheel bearing and transmission life by recommending lubricants and maintenance schedules.

6. Stretch tire mileage by analyzing and correcting causes of excessive tire wear.

7. Get more power . . . use less fuel by recommending adjustments to take full advantage of available fuels.

STANDARD OIL COMPANY (INDIANA)
AUTOMOTIVE ENGINEERING SERVICE LOWERS MILEAGE COSTS

HOW TO GET MORE YARDAGE ON LONG HAULS

SMOOTH TOURNAPULLS SPREADING saved Contractor Teichert extra spreading tools on Calif. airport fill.

Team Tournapulls, D8 Pusher Rooter and Motor Grader

Because Tournapulls are quickly pusher loaded, haul at fast construction speeds (up to 14.3 m.p.h.) and spread their own loads, they move more yardage faster. Same time, Tournapulls conserve manpower and steel, badly needed for Victory, by eliminating such one-purpose tools as shovels and elevating graders for loading, trucks for long hauls and special spreading tools on the fill.

To get the maximum yardage from your Tournapulls, and thus speed Victory projects to earlier completion, we suggest the following:

"Caterpillar" D8's for Pushing

Smart contractors have found the more powerful the pusher, the quicker you get capacity loads; consequently, they use "Caterpillar" D8 tractors whenever possible

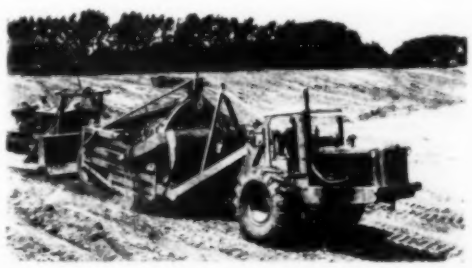
High Speed Haul Roads

To get high average speed on Tournapull jobs, don't overlook the importance of well-maintained haul roads. By using a "Caterpillar" motor grader to maintain roads and keep down dust, you reduce time-eating gearshifting and operator fatigue, get less wear and tear on equipment, cut rolling resistance and reduce accident possibilities.

Rooting in Tough Material

By keeping a LeTourneau Rooter hooked to your pusher tractor, for Rooting between loads, you can save blasting in many hard, rocky materials. Rooting cuts down loading time and distance, increases the yardage you can handle . . . and reduces tire wear, Tournapull and Scraper maintenance.

Your local LeTourneau-"Caterpillar" dealer can give you many more job-planning ideas to help you get maximum yardage and lowest costs with Tournapulls or tractors. To keep your equipment working at peak efficiency, he's ready to serve you with genuine LeTourneau parts and factory-trained service experts. Call on him TODAY . . . and any day you have job planning and equipment maintenance problems.



Working on a 7920-foot round trip haul, 4 of these 150 h.p. Super C Tournapulls, with LeTourneau 15-yard (heaped) LP Carryall averaged a cycle every 10 minutes on a Calif. airport. Contractor: A. Teichert & Sons.

Compare these victory-speeding yardages with what you get from older, conventional methods and equipment.

	98 H.P. Model C (11 yards heaped)		150 H.P. Super C (15 yards heaped)	
Haul One Way	Trips	Pay Yards	Trips	Pay Yards
600	17.1	150	15.0	180
1200	14.0	119	12.0	144
1600	12.3	104	10.7	129
2000	10.9	93	9.7	116
3000	8.4	71	7.6	91
5000	5.8	50	5.4	65

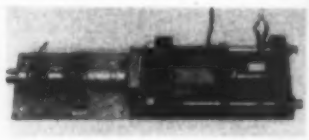
These figures are based on a 60-minute hour, loading in common earth on the level with a "Caterpillar" D8 pusher and hauling over good roads.

LOADING ROOTED ROCK on an Oregon State Highway job. By using a LeTourneau Rooter in combination with Angledozer on his pusher tractor Contractor Frank Penepacker cut Tournapull loading time and boosted yardage output.

In the field of "Balance", a problem confronting the engineer may be one of preventing or correcting unbalance or of maintaining constant loads or equilibrium in a test system. Some instruments which are useful in these problems are:

BALANCING EQUIPMENT

A portable set of vibration equipment with which the amount of unbalance in motors, generators and other rotors can be determined and corrected.



TORQUE MEASURING SYSTEM

A flexible system for the accurate measurement of torque or twisting moment in shafts, bolts, and test or production equipment. It consists of a torquemeter pick-up, indicating or recording instrument, test frame and other necessary equipment.

LOAD MAINTAINER AND CONTROL VALVE

An answer to the difficult problem of maintaining loads or pressures in test assemblies with safety and accuracy.

* * *

Other instruments in the field of resistances, reactions, and loads are: Proving Rings to measure static loads or reactions in equipment or structures; Load Plugs to measure pressures or loads in rolling mills and other machinery; auxiliaries, amplifiers, recorders.

He feels the balanced rhythm in a spinning motor's song

It's a motor's grim business today to keep humming; our business to help keep motors fit.

Periodic testing of equipment . . . providing experienced engineering field service and laboratory facilities for determining, recording, and analyzing strains, forces, and vibrations in and on structures of all kinds . . . this is the unique function, doubly important today, of WAUGH LABORATORIES.

Nereus H. Roy, *Director*, at the address below, will gladly answer inquiries explaining the application of WAUGH LABORATORIES' service to your particular business.

WAUGH *Laboratories*

A DIVISION OF WAUGH EQUIPMENT COMPANY • 420 LEXINGTON AVENUE, NEW YORK, N. Y.
Pacific Coast Branch: 714 West Olympic Blvd., Los Angeles, California

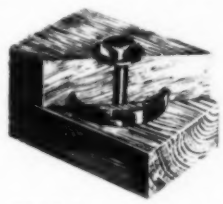
FREE— A REFERENCE FOR THE USE OF ARCHITECTS AND ENGINEERS

You draw on the successful experiences of many leading designers of timber structures . . . when you consult this fine reference book.

Detailed framing plans of 45 representative structures are included in *Typical Designs of Timber Structures*, with handy tables for use in timber design.

You will see how capable the TECO System of construction handles . . . short-span, as well as longer trusses.

If you haven't received your copy . . . Please use the attached coupon.



TECO Ring Connectors spread the load on a timber joint over practically the entire cross-section of the wood.

Timber
ENGINEERING COMPANY
1319 EIGHTEENTH STREET, N. W., WASHINGTON, D. C.

TIMBER ENGINEERING COMPANY, 16
1319 Eighteenth St., N. W., Washington, D. C.

Gentlemen:

As yet I haven't received *Typical Designs of Timber Structures*. Please rush my copy.

Name
Firm
Street
City State

Koehring Paver stability permits practically right angle pouring. Bucket can travel to end of boom for maximum spreading area.

Double-Quick Dumping and Spreading

Koehring Pavers, Twinbatch and Unibatch, have the special fast spreading Twin-Door boom bucket. Twin doors, both opening same direction, provide Double-Quick Dumping and Spreading. Twin ribbons of concrete are spread on the grade. Action is instantaneous . . . large Twin-door opening is approximately 13 square feet. Full width of bottom is used for door opening. No choking at bucket doors with dry or harsh concrete. Bucket shaking is not necessary. Seconds saved when dumping and spreading cut batch cycle time.

KOEHRING COMPANY, ***Milwaukee, Wisconsin***

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

"WE KEEP HORSEPOWER IN THERE FIGHTING"

"Caterpillar" men are building Diesels faster than anybody ever built them before. And "Caterpillar" dealers are keeping machines in fighting trim for the one big job that faces all of us.

Now that every horsepower is needed for war duty, your "Caterpillar" dealer takes on an increased responsibility. With a parts-and-service organization recognized as the finest in the heavy machinery industry, he is concentrating on keeping the machines ready and rolling. There's a lot of tough power and long, useful life built into "Caterpillar" Diesel Tractors, Motor Graders, Engines and Electric Sets, and he knows how to make them give all they've got.

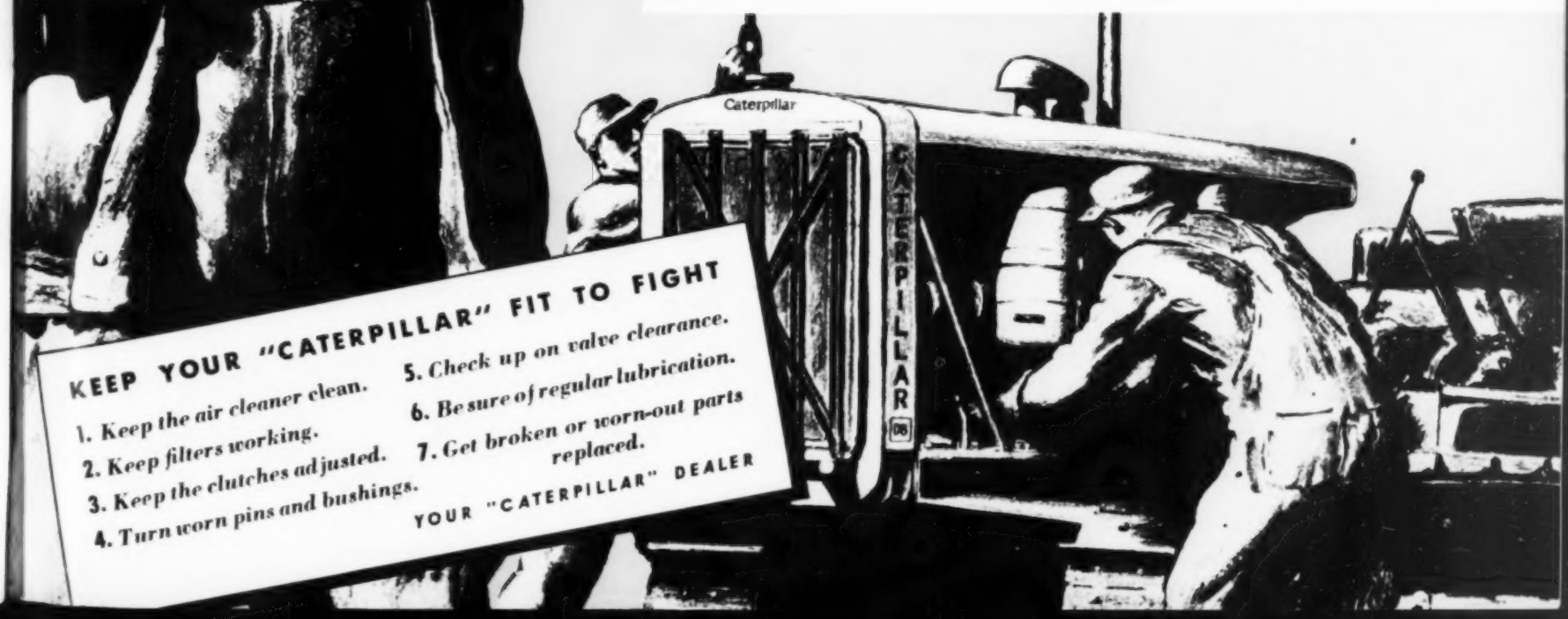
Have your "Caterpillar" Diesel inspected and serviced. Then *use* it in the all-out production effort needed to win the war!

CATERPILLAR *DIESEL*

REG. U.S. PAT. OFF.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

TO WIN THE WAR: WORK—FIGHT—BUY WAR SAVINGS BONDS!



KEEP YOUR "CATERPILLAR" FIT TO FIGHT

1. *Keep the air cleaner clean.*
2. *Keep filters working.*
3. *Keep the clutches adjusted.*
4. *Turn worn pins and bushings.*
5. *Check up on valve clearance.*
6. *Be sure of regular lubrication.*
7. *Get broken or worn-out parts replaced.*

YOUR "CATERPILLAR" DEALER

FOR MORE THAN 40 YEARS CONTRACTORS HAVE AGREED THAT *It Pays to . . .*

★ Back in 1900, when the first SMITH Tilting Mixer went to work, hosts of contractors, recognizing the merits of this mixer, decided to "Stick with SMITH".

More than 40 years later, contractors of the present generation as well as those of "the old school", knowing the record of SMITH MIXERS through all these years, repeat: "Stick with SMITH".

Many of America's greatest developments . . . power dams, industrial plants, highways, airports, buildings, housing projects, etc. . . . were poured with SMITH MIXERS. In the complete Smith line, there's a mixer for every concrete job, to assure speed and economy in today's strenuous demands. Write Dept. CM. . The T. L. Smith Co., Milwaukee, Wis., for catalog . . . state type of work to be done.

TRAIL-SMITH 7-S or 10-S

. . . trailer type, permits towing at fast driving speeds behind car or truck, to cut transportation time between jobs. Compact, lightweight . . . economical and fast. (Catalog 159-B)

SMITH 7-S or 10-S

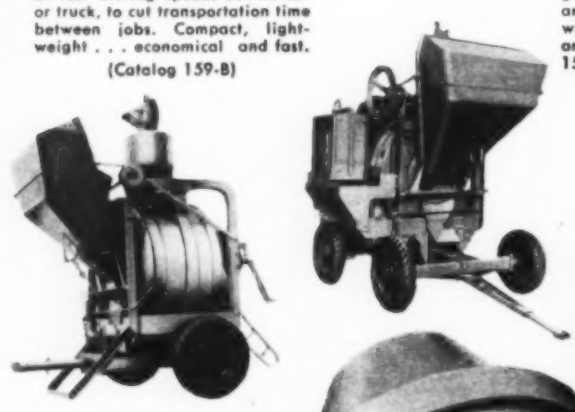
. . . 4-wheel, end discharge . . . gives you top speed ON the job, and TO the job. Compact (5 ft. wheel-base). Works in narrow areas. Ideal stability. (Catalog 159-B).

SMITH 14-S

. . . for all good size jobs where ½-yd. mixer capacity is desirable. Big, wide skip permits speedy charging from trucks. Built for toughest schedules of speed and yardage. (Catalog 188).

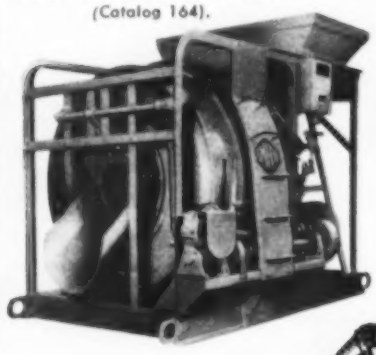
SMITH 3½-S

. . . the little mixer that delivers BIG yardage of quality concrete, fast, at low cost . . . built to endure hard service. Easy to transport. (Catalog 206)



SMITH 28-S

. . . faster, streamlined 1-yd. mixer . . . new variable speed drive assures fast, complete discharge on dry or wet batches. (Catalog 164).

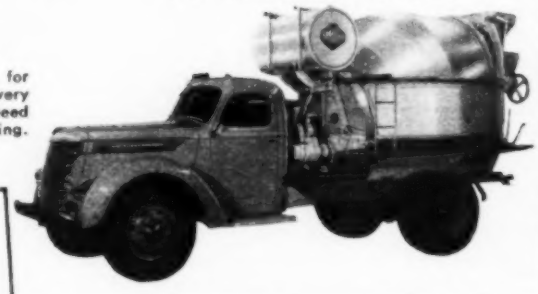


SMITH *TILTING* MIXERS

. . . 1-, 2-, 3- or 4-yd. sizes . . . for big concrete projects. Excel in every phase of batch cycle . . . more speed in charging, mixing and discharging. (Catalog 160-A).

SMITH-MOBILE

. . . the "last word" in truck mixers and agitators. The original HIGH-DISCHARGE machine that has proved its superiority under all operating conditions over a period of many years. 5 sizes available. (Catalog 198-B).



SMITH MIXERS

THE T. L. SMITH COMPANY
MILWAUKEE, WISCONSIN

YOU CAN *Handle all kinds of jobs*

Runway construction — huge military airport.

Street work in Minneapolis.

Spreading heavy course of slag with Buckeye Spreader and strike-off attachment.

Soil stabilization job — mixed material fed from paver into Spreader.

with a BUCKEYE SPREADER!

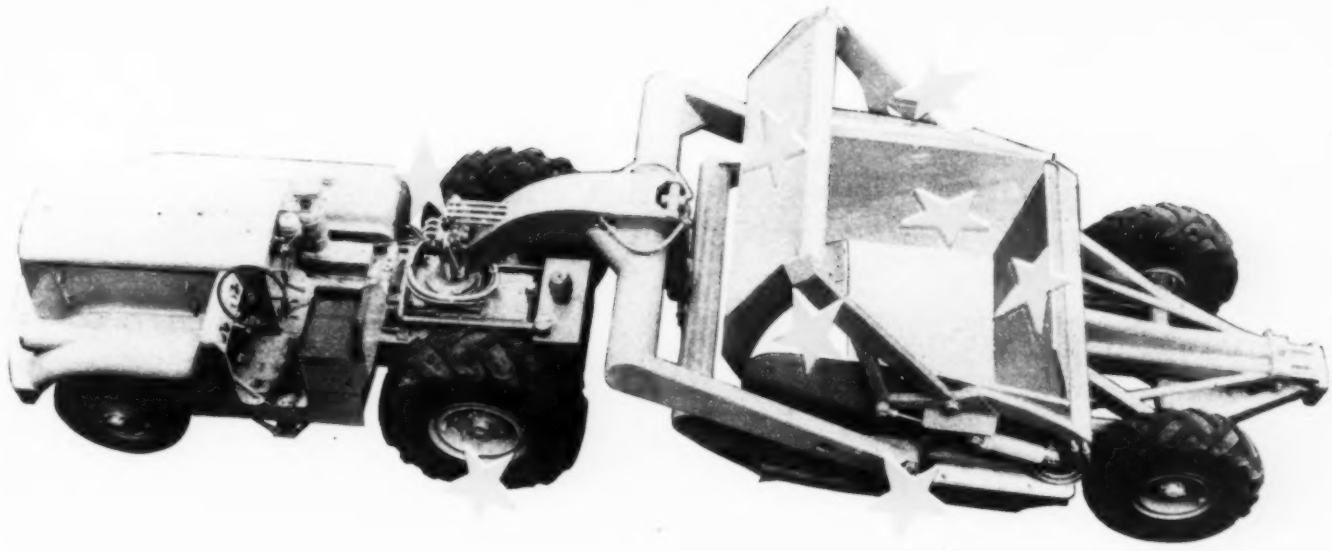
ACCURACY plus versatility makes the Buckeye Spreader an ideal machine for maintenance and construction of roads, streets and runways. This machine will handle everything from a fine sprinkle of sand up to a heavy course of rock, and with a strike-off attachment will put down courses up to six inches deep.

Transmission-driven feed roll is synchronized with truck speed and operates forward or reverse. Wheels are well in from end of box to permit spreading close to shoulders or obstruction. Spiral distributor, available when desired, feeds even wet or slightly tacky material to ends of box. Flow stops without dribble by manual control, or automatically when truck stops. These and other construction features that provide as high as 98-99% accuracy described in Buckeye Spreader Bulletin. Write for your copy.

BUCKEYE TRACTION DITCHER COMPANY, Findlay, Ohio

Built by **Buckeye**

GET THESE FEATURES



IN A HIGH-SPEED, LONG HAUL CW-10 "CARRIMOR" SCRAPER

Capacity — 10 cubic yards

Speed — up to 18 miles per hour

Hydraulic Control — smooth, powerful, trouble-free, easy operation and instantaneous response

Easy Loading — curved cutting edge, bowl bottom and push-out gate — correct cutting angle

Clean Dumping and Smooth Spreading — positive power to completely clean sides and bottom — spread any depth to 15½ inches

Safety and Stability — low center of gravity and hydraulic brakes

Freedom From Overhead Obstructions—so unit can be loaded by shovel if desired — can be used as a hauling unit

High Apron Lift — so that sticky or bulky material can be loaded and unloaded

Built of fine material, to a proved design, by skilled workmen

Short turns

are easy and safe with the CW-10 "Carrimor". A low center of gravity provides stability which minimizes the danger of tipping and resulting lost time. Note also the high apron lift which permits loading and unloading sticky gumbo or clay, and bulky materials.

COMPLETE EQUIPMENT

EARTHMOVING — Hydraulic and Cable Scrapers, Trailbuilders, Bulldozers, Rippers, Tampers and Scraper Pushers

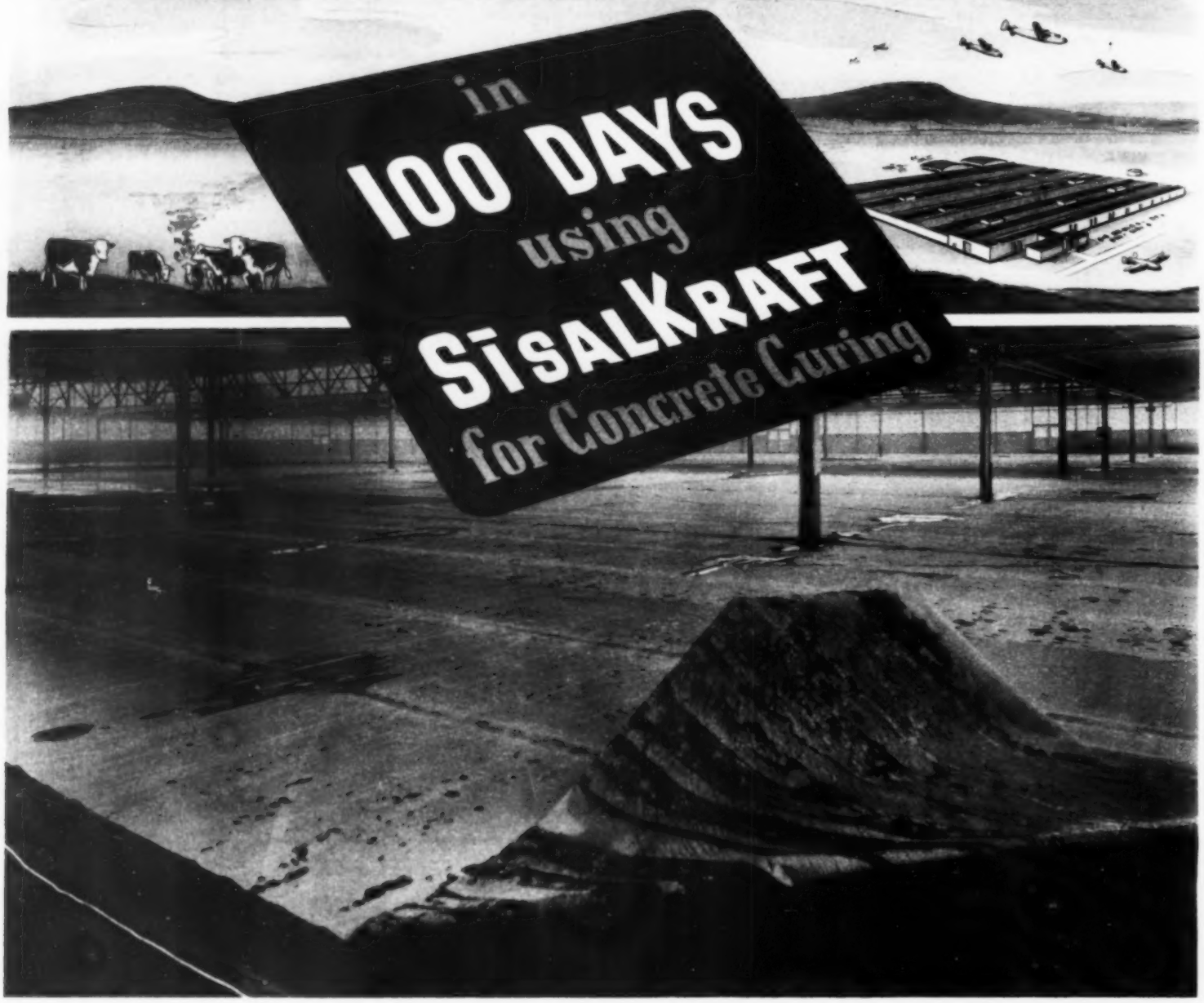
LAND CLEARING — Treedozers, Brushcutters, Root Cutters, Rake Blades, Stinger Blades, Weed Eradicators, and Stump Splitters

SHOW REMOVAL — Tractor Snow Plows

LAPLANT-CHOATE *Manufacturing Co* INC.

Cable Address "LAPCHOATE" Cedar Rapids Iowa, U.S.A

PRAIRIE to PRODUCTION



THIS big southwestern aviation factory is typical of huge arms plants throughout the country that are being rushed to completion in record time. And, as in so many others, SISALKRAFT is being used to cure the concrete floors . . . in this case, more than a million square feet.

SISALKRAFT curing is fast, efficient, economical. It's automatic — leaves nothing to chance — after the blankets are in place, produces results comparable to complete water immersion, without ponding, sprinkling or further inspection.

White cement floors are kept spotlessly clean. Many re-uses of the inexpensive SISALKRAFT blankets result in remarkably low curing costs.

SISALKRAFT, in rolls, covers or blankets to fit any job, is being supplied for essential war construction. Write for data, samples, and details of SISALKRAFT on-the-job service.

The SISALKRAFT Co., 205 W. Wacker Drive, Chcago, Ill.
NEW YORK - 101 Park Ave. SAN FRANCISCO - 55 New Montgomery St.

Protection
AT LOW COST

SISALKRAFT covers are pliable, tough, durable, and waterproof. Take the place of tarpaulins, now costly and difficult to get quickly. Use SISALKRAFT to cover cement, equipment and materials — to close-in, build temporary shelters. It's "weather insurance" on any job.

SISALKRAFT
The Standard Paper for CONCRETE CURING

Awarded the Navy "E" for excellence in war production, P&H displays it also as a pledge of future effort.

P&H

fit — FOR TODAY'S PRODUCTION

— keeps fit for years to come

Welded construction of rolled alloy steels gives you greater strength — years of increased service.

True tractor-type crawlers give you smoother, easier movement — freedom from crawler troubles.

Automotive hydraulic control — easier on the machine; easier for the operator.

Triple-safe planetary boom hoist enables you to stop and hold the boom at any elevation — boom **can't** drop suddenly.

If you don't have these — and other P&H advantages — you don't have all your money could buy.

General Offices: 4494 W. National Avenue, Milwaukee, Wisconsin

HARNISCHFEGER CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS • HOISTS • WELDING ELECTRODES • MOTORS

BE A STEP AHEAD WITH P&H

MORE FOR YOUR EXCAVATOR DOLLAR

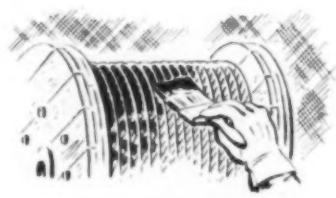
"We build the stamina in... proper lubrication will keep it there!"

"Yes sir, Roebling 'Blue Center' Steel Wire Rope leaves our shops ready to give you the longest, lowest-cost rope service you can buy at any price. But, neglect it in service—give it the absent treatment as far as lubrication is concerned—and you are literally throwing good rope steel and a portion of your rope service out the window.

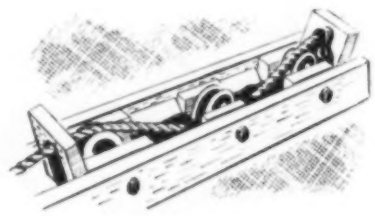
Pound for pound, wire rope probably has more bearing surface (inside the rope) than any other piece of machinery. Think of wire rope as a precision machine and you'll give it the same care as any fine equipment. All right, you say, what's the best type of lubricant to use—what's the best way to apply it?

As a starter, the best lubricant is one made specially for lubricating wire rope (never discarded crankcase oil!)... free from acids and corrosive elements . . . generally heavy-bodied, straight mineral lubricants of good penetrating and adhesive qualities. In addition, make sure it does not cake, gum or ball-up if contaminated with an excess of dust, dirt or metallic particles. And it must *not* thin down under high temperatures. If you're in doubt about what you're using, Roebling Engineers will give you recommendations as to the proper type.

Now, there have been lots of arguments about the best way to lubricate . . . principally because wire rope operates under such widely varying conditions. But here are some basic facts.



Some prefer to apply it with a brush. It's the simplest way—not always adequate but certainly better than none at all. If you brush, do it slowly, carefully, frequently . . . for it's the most difficult method to get complete coverage and penetration.



A better way is this simple three-sheave trough. It should be firmly fixed near the reel or drum, the lubricant applied hot and the rope run through not faster than 30 feet a minute. And, there are as many other good lubricating devices as human ingenuity can devise—to meet specific operating conditions.

One more pointer . . . be sure that your wire ropes are well lubricated when not in service—for when ropes are idle is when they are most susceptible to rust destruction. And, finally, set up a periodic lubrication and inspection schedule . . . so that you get maximum useful rope life . . . so that you get the extra service that has been built into every inch of wire rope that bears the Roebling Trademark . . ."

JAR ROEBLING

Extra rope service from Roebling Research and Engineering, from the knowledge of men in the Roebling mills, of Roebling men in the field . . . they all add up to "Blue Center"—the Roebling wire rope that offers you lowest average operating cost per ton of material handled.

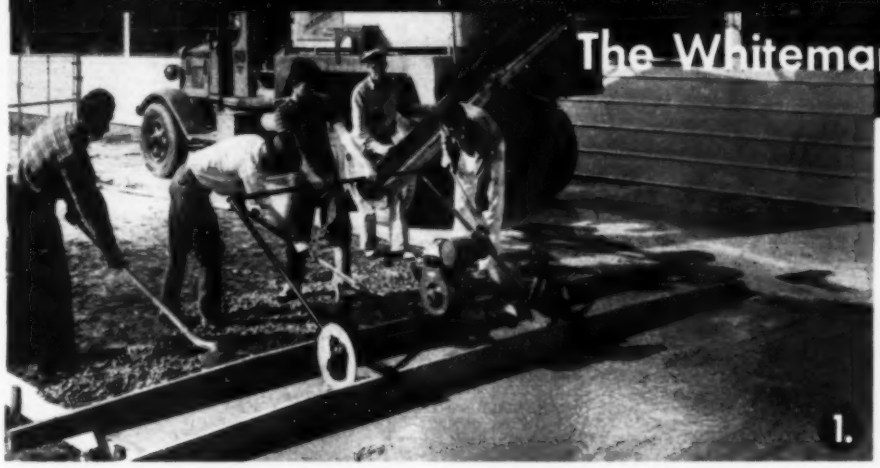
☆

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY
Branches and Warehouses in Principal Cities

ROEBLING
"Blue Center"
STEEL WIRE ROPE
PREFORMED OR NON-PREFORMED

WHITEMAN MACHINES
Finish Better Concrete—*FASTER!*

The Whiteman 3-Step Method—



The Whiteman Rodding Machine—operated by one man, keeps up with any method of concrete delivery, simultaneously levels and condenses the pour with its power operated screeds.

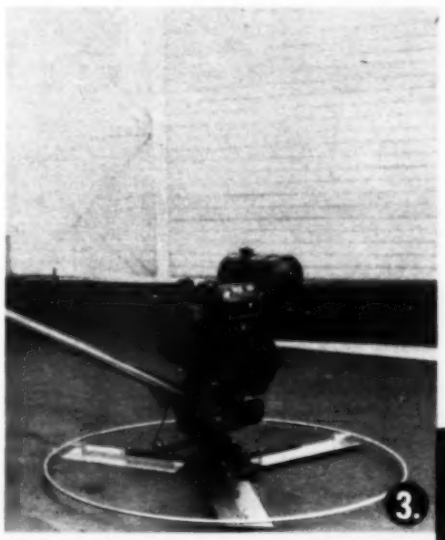
Here's the way to lay your concrete faster — indoors or outside. Put Whiteman Machines on your job—multiply the capacity of your men—get better concrete surfaces in less time, at lower cost!

Only two types of Whiteman Machines are needed!
Each step of concrete slab work is speeded by Whiteman Machines.

Floating the slab is a quick, simple job for one man with the Whiteman Finisher equipped with "Heavi-Duti" Trowels.

1. SCREEDING—One operator with the Whiteman Rodding Machine can simultaneously level and condense 4 cu. yd. of low slump concrete in 5 minutes. The power operated screeds, pulled forward by the operator produce denser concrete faster than any hand screed crew.

2. FLOATING—Put the Whiteman Precision Finishing Machine with "Heavi-Duti" FLOAT TROWELS on the job. Here, again, one man gets better results, FASTER! With the weighted, power-rotated, flat trowels, one operator compacts the mix, easily covers 1,000 sq. ft. in 15 minutes.



Finishing is fast, surfaces are harder when you use a Whiteman Finisher – with CRUCIBLE STEEL Finishing Trowels.

3. FINISHING—When ready to finish the slab, change trowels on the Whiteman Finisher and use the CRUCIBLE STEEL "FINISHING" TROWELS. Again the motor operated (gasoline or electric powered) machine does better work in less time. Your crews can do MORE than TWICE AS MUCH WORK as by hand. If you have a concrete laying job to do in a hurry—call on Whiteman—probably we can help you as we have scores of others.

WHITEMAN MANUFACTURING COMPANY

3249 Casitas Avenue—Los Angeles, California

ALL MICHIGAN SHOVELS-CRANES are quickly convertible to any standard front-end attachment.

MICHIGAN Mobile SHOVELS-CRANES —for FASTER Construction!

Owners are setting records on new construction, on maintenance work, in industrial plants and on scattered operations with the MICHIGAN Mobile SHOVEL-CRANE. Fingertip Air-Controlled clutches enable operators to maintain fast-pace production without let-downs due to operator fatigue. Maximum stability is provided by the low gravity center and low unit ground pressures of Model TMCT-16 (½ yd. Dual Tandem Drive). This complete MICHIGAN unit, mounted on its own specially designed MICHIGAN chassis, is fully described in Bulletin E52. Write for your copy.

The smaller MICHIGAN Model T6-D (⅜ yd. Single Axle Drive) is noted for its great productive capacity over a wide range of operations. This single-engined truck-type excavator-crane has its *own* specially designed and constructed chassis. Like the larger TMCT-16, Model T6-D's great stability is an outstanding feature, as are the Fingertip Air Controlled clutches. Model T6-D is praised by owners for its low maintenance costs, flexible operation and high output. Bulletin CM62-1 tells why. Your request brings full data by return mail.

SPECIFICATIONS Models TMCT-16 and T6-D

Model	Capacity	Weights		Tail Swing	Gross Allowable Weight Rating
		Shovel	Crane		
TMCT-16	½ yd.	28000 lbs.	26000 lbs. to 28000 lbs.	7'-9"	35000 lbs.
T6-D	⅜ yd.	20500 lbs.	19000 lbs.	5'-6"	26300 lbs.

Bulletin CM52-2 contains detailed specifications on Model TLCT-16 (Dual Tandem Drive) designed especially for high-speed cranework. Model TF6 (⅜ yd. Four-Wheel Drive) and Model C-16 (½ yd. crawler) are completely described in Bulletins CM52-3 and CM52-4, respectively.

MICHIGAN POWER SHOVEL CO.

Benton Harbor Mich., U. S. A.

★ ★ ★

MICHIGAN AIR-CONTROLLED

SHOVELS - CRANES - CLAMS DRAGLINES - TRENCH HOES

Soldier of War

on the home front

He is a mechanic . . . one of the thousands of soldiers of war on the home front who are fighting to "keep 'em rolling." He knows how much depends upon him . . . and he's doing a job to be proud of!

Right now, and for as many months and years as the war lasts, his job is to keep existing vehicles in front line service through good maintenance. We of Timken are ready and anxious to help him in every way we can . . . so he in turn can help win the battle of construction that will have such a decided effect on the outcome of battles fought on the fighting fronts.

If this man, or any of his brothers, works for you, write us today for the many A. M. (Axle Maintenance) aids we have prepared to help him win his fight. They are yours — and his — simply for the asking.

TIMKEN AXLES

THE TIMKEN-DETROIT AXLE CO., DETROIT, MICH.
WISCONSIN AXLE DIVISION, OSHKOSH, WISCONSIN

Timken's Job: To Axe the Axis with Axles

A new Axle Inspection wall chart is the latest Timken A. M. aid. Be sure to specify it when writing.

Construction Methods

ROBERT K. TOMLIN, Editor

Volume 24 | JUNE, 1942 | Number 6

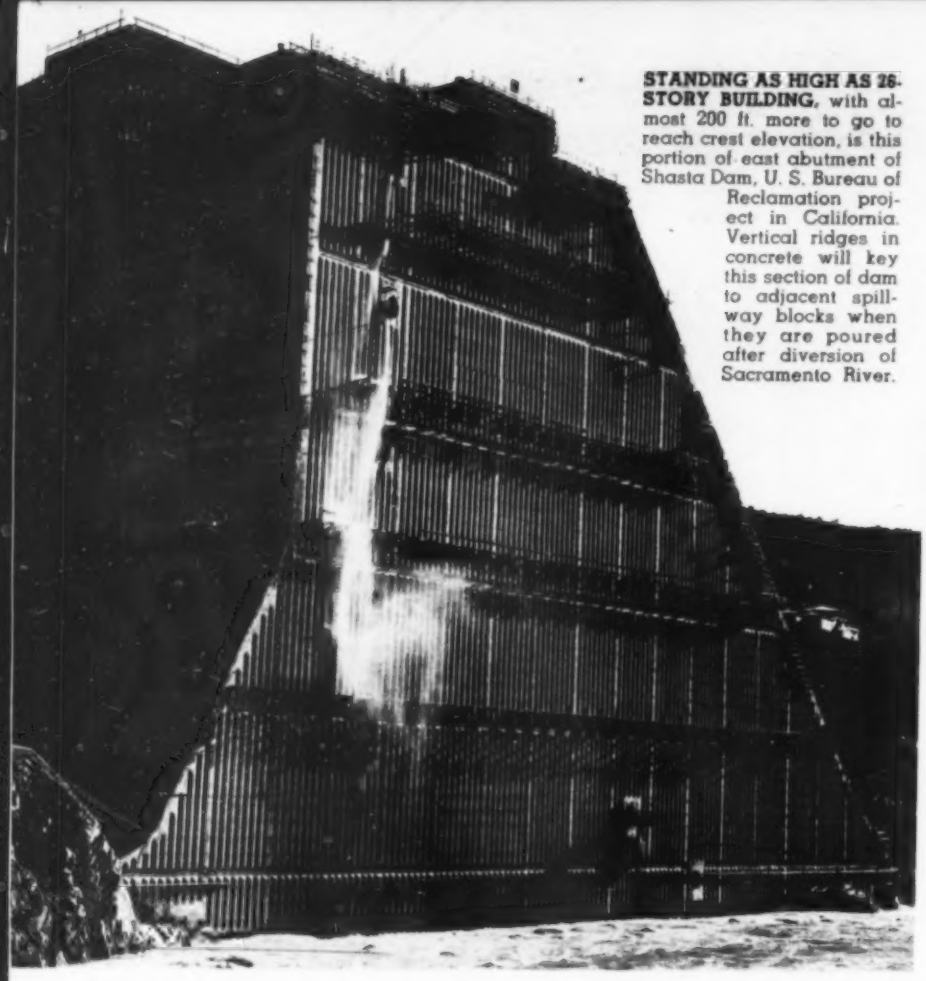
WITH TRUCK-SCRAPER UNIT speeds range from 18 to 20 mph. loaded and from 25 to 27 mph. empty.

Truck-Scraper Rigs MOVE EARTH AT AIRPORT

TO SPEED EARTH MOVING at a Pacific Coast airport the Western States Construction Co., of Los Angeles, Calif., made effective use of the motor truck-carrying scraper combination illustrated herewith. Two of these units were used, consisting of standard Ford V-8 trucks hauling Adams and Wooldridge scrapers. Speeds of from 18 to 20 mph. loaded and from 25 to 27 mph. empty were obtained with these outfits.

Pat Dowling Photo

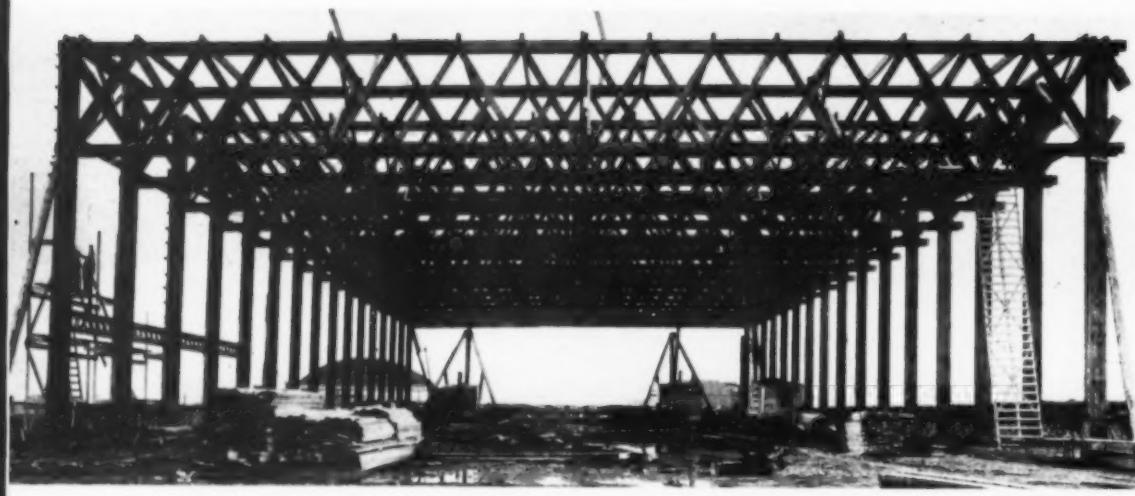
DETAIL OF HOOKUP between Ford truck, serving as tractor element, and carrying scraper unit.



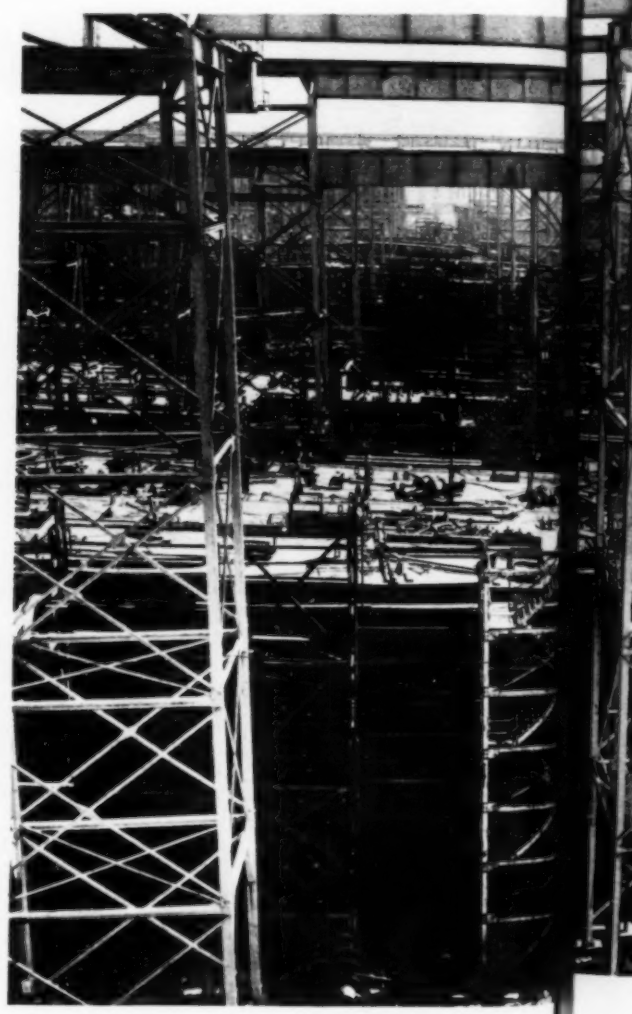
STANDING AS HIGH AS 26-STORY BUILDING, with almost 200 ft. more to go to reach crest elevation, is this portion of east abutment of Shasta Dam, U. S. Bureau of Reclamation project in California. Vertical ridges in concrete will key this section of dam to adjacent spillway blocks when they are poured after diversion of Sacramento River.

HEAVY EXCAVATION and earth-moving operations are under way by Morrison-Winston-Shea-Twaits contracting organization at Santa Fe Dam, U. S. Engineer Department flood control project in California. Earth-fill structure, with maximum height of 92 ft. and crest length of 23,805 ft., will have volume of 12,000,000 cu.yd. Here shown are pair of Marion electrically operated shovels loading earth into Euclid wagon, in foreground, and into trucks with capacities up to 25 cu.yd.

Pat Dowling Photo



WOOD TRUSSES OF 128-FT. SPAN, fabricated with aid of timber connectors, are erected to carry roof of 260x780-ft. main building in British Columbia for manufacture of flying boats by Boeing Aircraft Co., Ltd., of Canada. At mill lumber is precut, bored, grooved and dapped for rapid erection in field by Carter-Halls-Aldinger Co., Ltd. Structure requiring 3,000,000 ft.b.m. of lumber will have exterior walls of plywood.



SOME OF 145 BUILDINGS (below), 20x100 ft. in plan, built by Robert McCarthy, California contractor, for alien reception center near San Francisco. This group of buildings is in central portion of Tanforan race track; "straightaway" of track is in foreground. Roofs and walls are of 4x8-ft. plywood sheets, as described in detail elsewhere in this issue.

TEST OF NEW TRANS-ISTHMIAN HIGHWAY (below) at Panama is made by U. S. Army field artillery unit. Trip over 48-mi. concrete-paved route was made in less than 3 hr., by more than 100 vehicles.

Press Assoc. Photo

THIS MONTH'S NEWS REEL

CONVERSION OF SANTA ANITA RACE TRACK into reception center for Japanese aliens, prior to their removal from defense areas in California, involves erection of 600 buildings with capacity of housing 18,000 persons. View is taken looking across former paddock and saddling stall structure, now equipped as hospital.

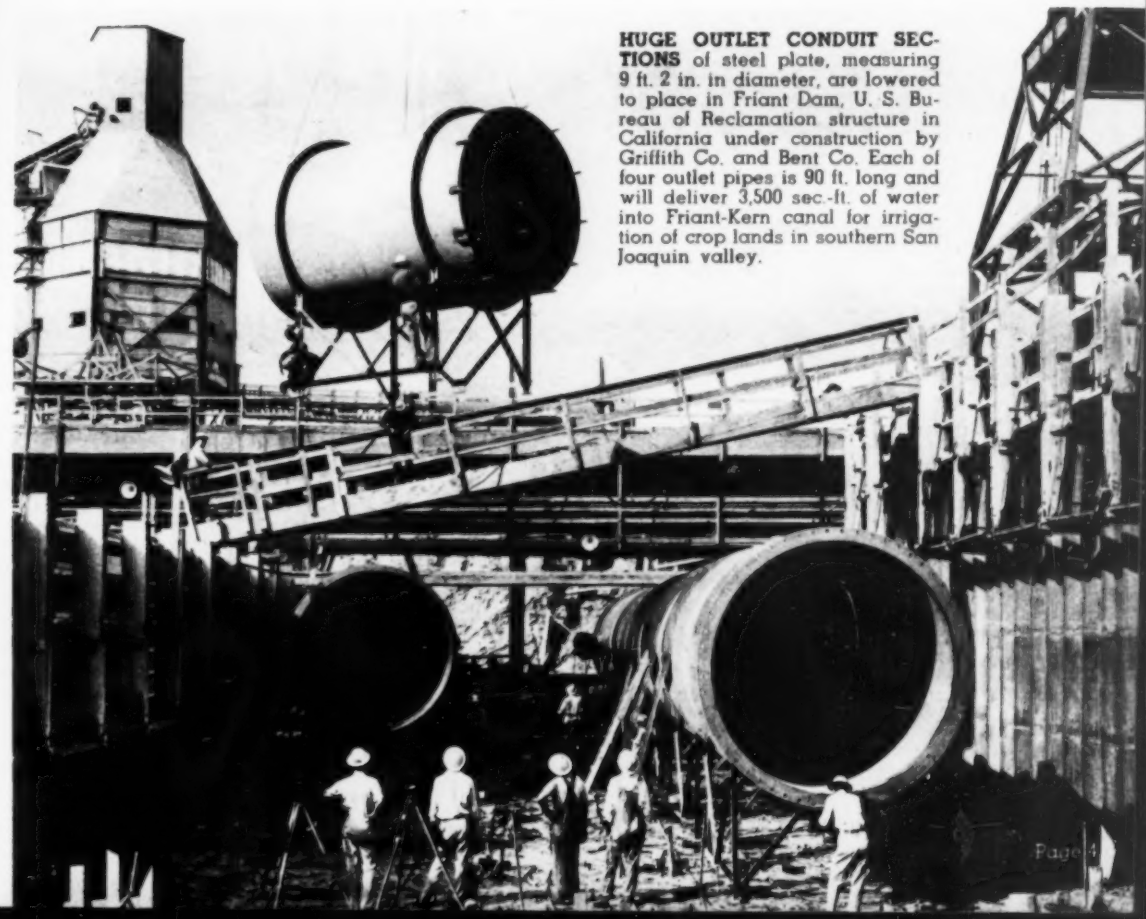
Pat Dowling Photo

Wide World Photo

TO INCREASE PRODUCTION OF TANKERS for Nation's oil-carrying fleet, East Coast shipyard expands facilities for building new hulls. Tall structural towers support craneways for handling materials on shipways.

BOMBED COVENTRY REBUILDS, following devastation caused by German air raids on English cities. Blocks of modern two-story brick and concrete buildings arise from ruins, despite shortages of labor and materials.

Wide World Photo



HUGE OUTLET CONDUIT SECTIONS of steel plate, measuring 9 ft. 2 in. in diameter, are lowered to place in Friant Dam, U. S. Bureau of Reclamation structure in California under construction by Griffith Co. and Bent Co. Each of four outlet pipes is 90 ft. long and will deliver 3,500 sec.-ft. of water into Friant-Kern canal for irrigation of crop lands in southern San Joaquin valley.

PERMANENT TRAFFIC STRIPE is applied on pavement center line with aid of machine carrying pair of parallel steel angle guide forms which are raised and lowered by two hand screws. Guide forms assure regular alignment and even width of 4-in. stripe.

BLACK IRON OXIDE for integral traffic stripe is scattered by operator on wet concrete between parallel angle forms which have been lowered into proper position on pavement surface by adjustment of two hand screws. Hand float rests on near angle.

Permanent Traffic Stripes and Rubber-Sealed Joints

ARE FEATURES OF CONCRETE PAVING JOB

USING HAND FLOAT fitting into 4-in. space between guide forms, operator works magnetic iron oxide into wet concrete to depth of at least ⅛ in. After completion of this section of traffic stripe, forms are raised by hand screws for move to next position.

COMPLETED PERMANENT RIBBON (below) behind striping machine shows good alignment, even edges and strong black tone in integral traffic guide between 11-ft. lanes. In distance, sprinkler truck wets burlap placed from rolling bridge.

STRIP OF PAPER (below) unrolling from traveling bridge covers fresh center stripe and protects it from burlap. Flexible metal strip holds paper down until it can be covered with burlap.

27E DUAL-DRUM PAVER traveling outside form lines places concrete in two-lane pavement 22 ft. wide. Strikeoff operated through outrigger tackle by winch on paver spreads first course of concrete 2 in. low for mesh reinforcement.

FOR THE PURPOSE of studying design innovations which promise a reduction in future maintenance, the Indiana Highway Commission specified for a 3.8-mi. length of four-lane concrete pavement completed last fall by William D. Vogel, contractor, Indianapolis, that the pavement be marked with permanent traffic stripes of black iron oxide floated into the concrete and that all joints be sealed with hot-poured rubber compound. The contract, involving a gross length of 4.2 mi. on U. S. 40 between Bridgeport and Plainfield, was one of several 1941 jobs which closed the last gaps in multiple-lane paving of this important highway over the 70-mi. stretch from Indianapolis to Terre Haute.

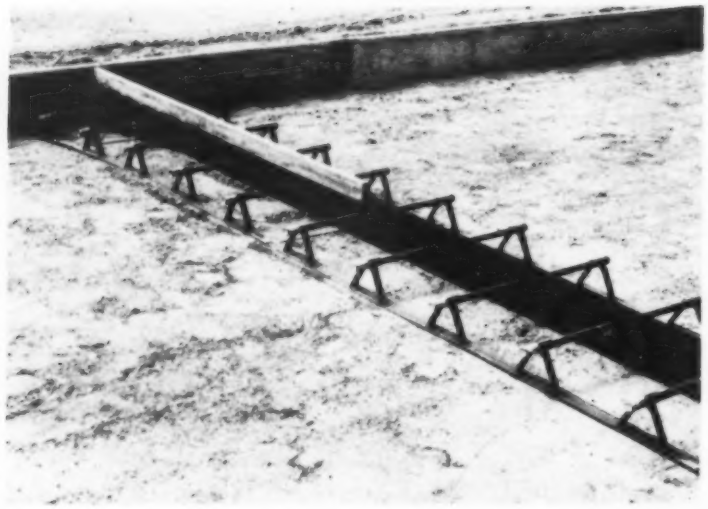
Except on 3,000 ft. of widening, where 11-ft. lanes were added to both sides of old 20-ft. slab

MEN IN CHARGE of job, KEITH C. CAWOOD (right), project engineer for state, and R. R. HART (center), superintendent for contractor, entertain an interested visitor, W. J. BOATRIGHT, engineer of specifications, Indiana Highway Commission.

on approaches to an existing bridge over a railroad, the pavement consists of new four-lane construction put down in two-lane units of 22-ft. width. Most of the pavement is on highway of divided design, with the two 22-ft. trafficways separated by a median strip or by white concrete center curb. A 27E dual-drum paver placed concrete in the 22-ft. slab, of 9-7-7-9-in. cross-section, at rates of 120 to 125 ft. an hour. Permanent center-line traffic stripe was applied at equal speed, ahead of the burlap men covering the slab for curing.

One operator placing and floating the iron oxide center-line stripe easily advanced his work, as rapidly as pavement construction permitted, with the aid of an adjustable, manually controlled machine devised by the contractor to meet specified require-

FINISHING OPERATIONS (below) preceding application of permanent traffic stripe employ, in order: (1) tandem-screed finishing machine, (2) joint machine for longitudinal center-line joint and transverse contraction joints, (3) hand-operated longitudinal float, (4) long-handled aluminum straightedges, (5) hand belting machine, and (6) hand brooms.



REMOVABLE CAP and wooden end plates on expansion joint filler form slots around three edges of joint for later sealing with rubber compound.

SLED-TYPE VIBRATOR drawn twice across pavement consolidates concrete around load transmission assemblies at expansion and contraction joints.

FINISHERS pull cap plates from expansion joints and metal strips out of contraction joints, leaving open slots to be sealed with rubber compound.

RUBBER COMPOUND comes to job in solid blocks of convenient size packed in paper bags. Compound is covered with non-injurious white material to keep paper from sticking to it.

PIPE JET connected by hose to portable air compressor cleans joint for sealing. Pocket has been dug in earth shoulder at edge of pavement to assist joint cleaning and later setting of metal plate dam.

ments. Transverse joints were sealed after the pavement had been cleared of wet straw cover used during the final 6 days of a 7-day curing period. A mobile outfit comprising a portable air compressor and a heating kettle enabled the sealing crew to make good progress in cleaning and pouring joints.

Integral Traffic Stripe

For use in the permanent traffic stripe, the specifications called for a crystalline pigment known as black magnetic oxide of iron or ferroso-ferric oxide made by a process of chemical precipitation to form a pigment of uniformly small particle size, not more than 2 percent of which would be retained on a 325-mesh sieve when tested by the water washing method. The specific gravity was required to be not less than 4.68. For the 4-in. width of traffic stripe on this job, the contract stated that the magnetic iron oxide should be applied at the rate directed by the engineer, about 2 lb. per 100 lin.ft. of stripe. The wetness of the concrete determined the amount of iron oxide needed, a wet concrete requiring more than the 2 lb. estimated. About 4 lb. per 100 ft. was actually used on the job.

Traffic stripe was incorporated in the slab surface after the final finishing operations of joint edging and brooming had been performed. Parallel steel angle forms, suspended by adjustable screw mountings from the traveling traffic stripe machine, guided the operator in scattering the pulverized iron oxide on the wet concrete and floating the pigment into the surface to a depth of at least $\frac{1}{8}$ in.

Because of the experimental character of the traffic stripe installation, patent rights and royalty fees for the process were waived on this project by the George S. Mepham Co., East St. Louis, Ill., which supplied the pigment. Success of the installation may be judged from the fact that the State Highway

Commission has specified permanent traffic stripes in concrete paving contracts awarded since October.

Traffic Stripe Machine

Parallel steel angle guide forms about 6 ft. long for application of the 4-in. center-line stripe were hung by adjustable screws from the front and rear trusses of a converted hand belting machine. Lower edges of the down legs of the 2x2x¼-in. steel angles were beveled 45 deg. toward the inside to form sharp edges which would penetrate slightly into the surface of the concrete when the forms were lowered. To maintain the center-line traffic striping apparatus in alignment with the edge of the pavement, a spring on the outer end of the front axle exerted pressure against the right front guide wheel of the machine to hold the wheel flange in contact with the road form.

At the forward end, the traffic stripe guide forms were supported by a hand screw mounted in fixed vertical position on the front truss above the center line of the pavement. At the rear end of the guide forms, a similar screw was attached to the center of the second truss by a swivel mounting which permitted sidewise adjustment of the parallel steel angles to match the edges of traffic stripe previously applied.

Applying Traffic Stripe

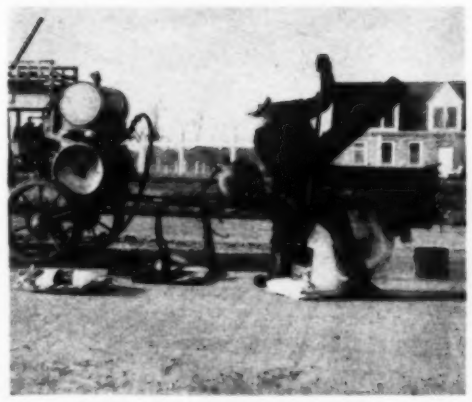
After completing one section of traffic stripe, the operator raised the angle forms clear of the pavement and moved the machine forward to its next position by working a hand propulsion lever. The rear end of the forms then was adjusted to coincide with completed traffic stripe, and the forms were lowered until the sharp edges bit into the pavement surface. With this end set, the operator next turned down the forward screw until the entire length of guide forms had penetrated slightly into the concrete.

Dry iron oxide was carried in a box on the machine. Scooping some of the pigment into a small can, the operator sprinkled the black powder in the area between the forms by tapping the can lightly against the steel angles. After distributing the material in this way, he worked the black coloring material into the surface with a hand float fitting into the 4-in. space between the forms. Accompanying photographs illustrate these operations.

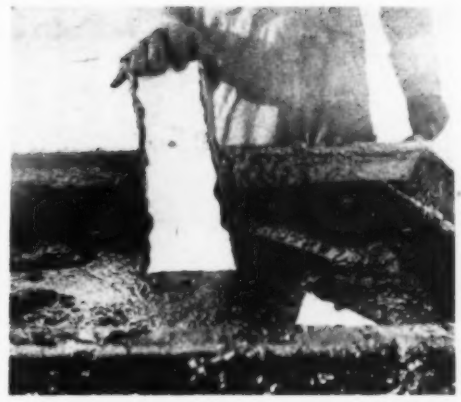
After each shutdown caused by rain, a carborundum brick was used to work up a mortar between the angles of the traffic stripe machine. A sand-cement mixture incorporating an abundance of cement was sprinkled in the mortar, and the iron oxide then was added as usual and troweled into the mortar, with excellent results.

To protect the fresh traffic stripe

(Continued on page 90)



AFTER PAPER BAG has been removed from block of solid rubber compound, workman cuts material into smaller pieces for faster melting, using spade heated with removable burner from mobile kettle behind him.

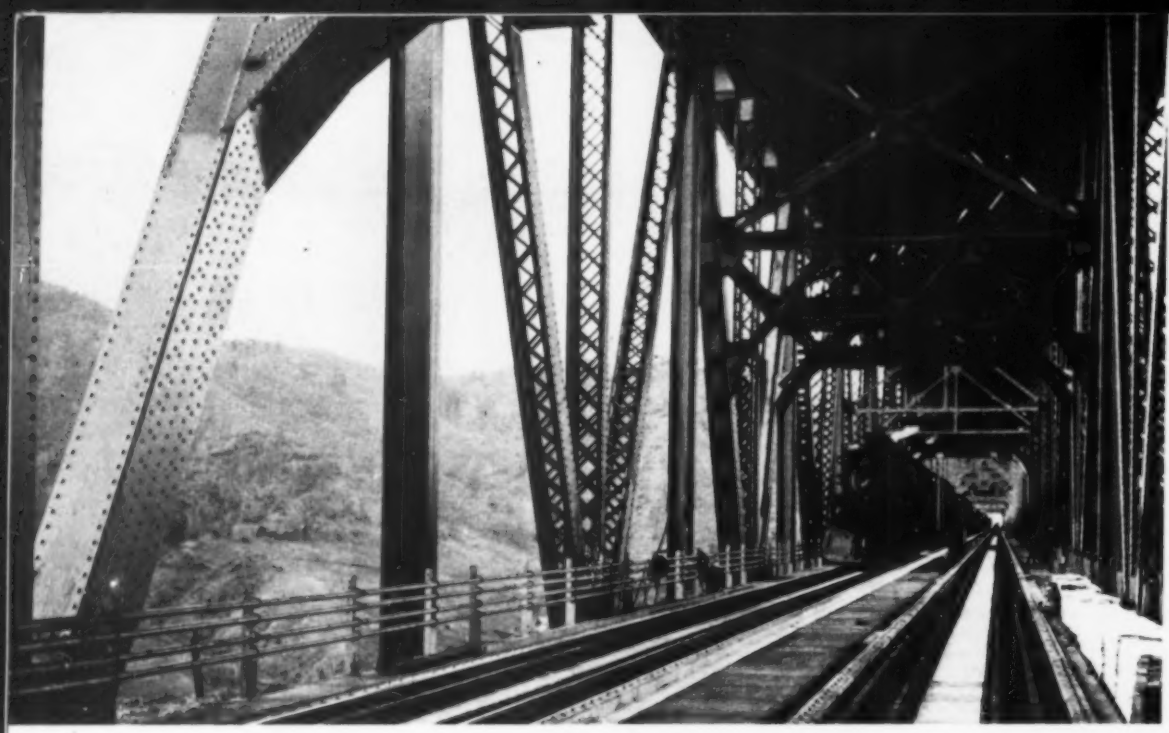


CUT PIECES of rubber compound are added to molten mass in heating kettle. Temperature of molten material averages about 425 deg. F.

METAL PLATE set at pavement edge and backed up with earth firmly pressed in place closes end of joint for sealing with hot-poured compound.

SPRINKLING CAN with sprinkler head removed pours melted rubber compound into joint. Several layers are required in pouring joint to keep material from running away from crown to low side of pavement. Rubber compound pours best when it has thick, mushy consistency at temperature of about 400 deg. F.

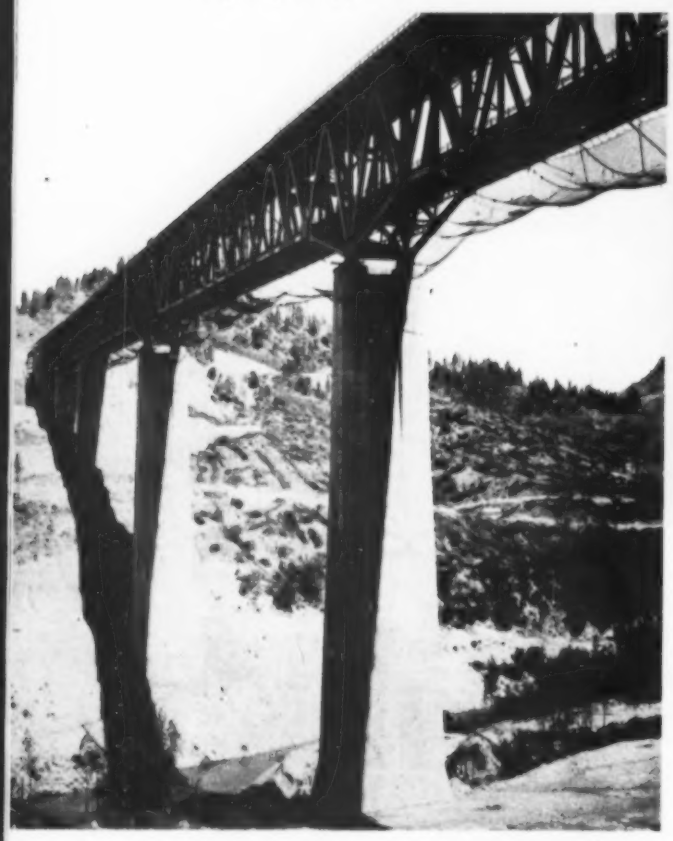
TWO SIZES of coarse aggregate are handled by crane into double-compartment bin in foreground. Second bin is for sand, and plant in background unloads, stores and batches bulk cement.



FIRST TRAIN crosses Pit River Bridge, world's tallest (500 ft.) double-deck structure, which forms part of 30-mi. railroad relocation around reservoir created by Shasta Dam in northern California. Bridge is 3,588 ft. long, carrying railroad tracks on lower deck and a four-lane concrete paved highway on upper deck.

Photos, U. S. Bureau of Reclamation

HEAVY CUTS AND FILLS, involving excavation of more than 4,000,000 cu.yd., were required by 30-mi. Shasta Reservoir railroad relocation. Here first freight train to operate on new line March 15 emerges from one of 12 tunnels included in 30-mi. relocation.



CARRIED BY CONCRETE PIERS 360 FT. HIGH at center, double-deck Pit River Bridge crosses canyon at elevation of 500 ft. above water level. During steel erection American Bridge Co. employed safety nets beneath lower deck to protect structural ironworkers.

Relocated Railroad Carries First Train Around Shasta Reservoir

WORLD'S HIGHEST DOUBLE-DECK BRIDGE, 500 ft. above water level in the deep Pit River Canyon above Shasta Dam, U.S. Bureau of Reclamation project in northern California, was unceremoniously dedicated March 15 by a southbound Southern Pacific freight which became the first train to pass over the spectacular new 30-mi. relocated railroad built around the Shasta Reservoir area. Riding in a special car at the rear of the train was an official inspection party including executives of the Southern Pacific Co. whose Sacramento Canyon line soon will be flooded out between Shasta Dam and Delta Station, and representatives of the U. S. Bureau of Reclamation, which constructed the great bridge and new railroad as part of the Central Valley Project.

Construction Engineer Ralph Lowry said the opening to traffic of the relo-

(Continued on page 86)

AT SACRAMENTO RIVER CROSSING (below) relocated railroad, placed in service March 15, carries first train on steel and concrete bridge 4,347 ft. long. On 30 mi. relocation there are 8 major bridges crossing rivers and streams.

Steel Saved

By Using Wire to Reinforce Precast Concrete Joists on Los Angeles Housing Projects

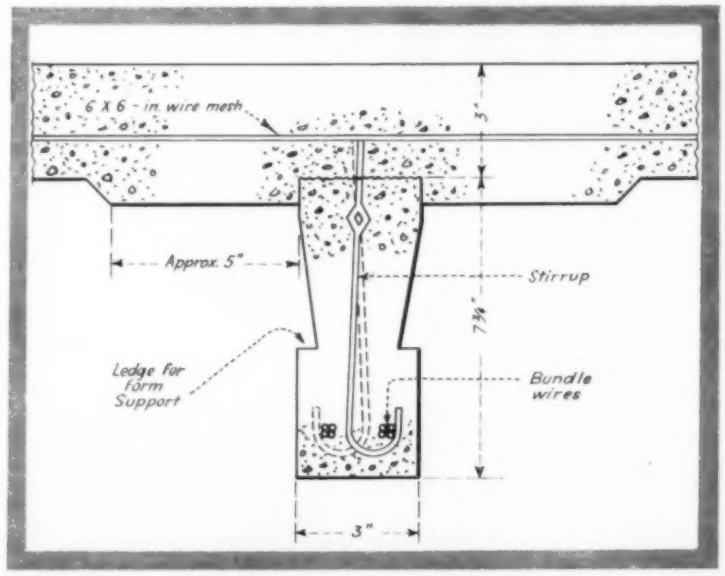
PUNCH PRESS forms curved carrier for bundle bars that are spot-welded to stirrup.

SPOT-WELDING joins carrier to stirrup made of No. 6 wire. Stirrups that have curved carriers on one leg have hook on opposite leg.

SAVINGS IN STEEL to meet war-time demands are accomplished by a new concrete floor design applied to three mass housing projects in Los Angeles, Calif. Features of the new design, which reduces the cost below that of a floor system of wood with the usual plastered ceiling below, are the elimination of steel bar reinforcement and the use of wire fabric in floor slabs and cold drawn wire in precast concrete joists. The scheme is a development of methods applied to the construction of a Navy warehouse, using precast concrete joists, as described in *Construction Methods*, December, 1941, p. 68.

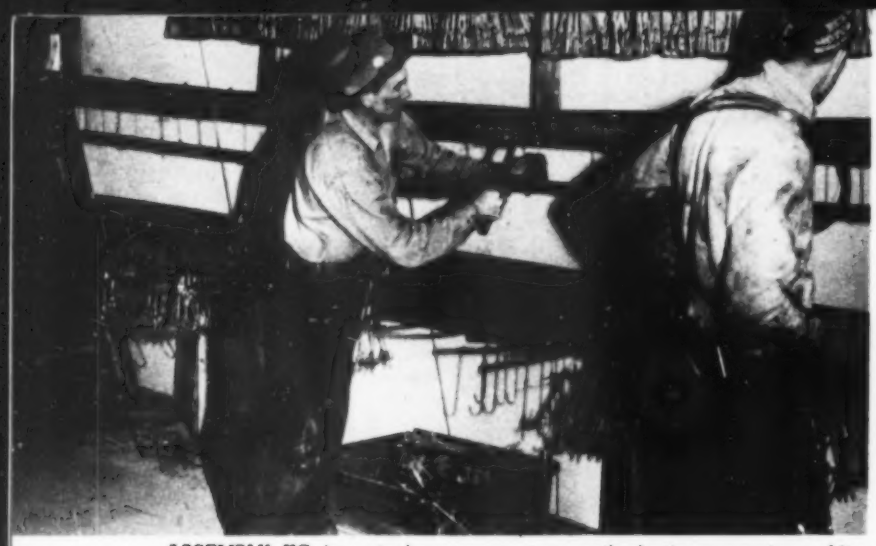
By using 3x7¾-in. precast concrete joists 14 ft. long, instead of flat slabs, the floor thickness was reduced from 5 to 3 in. (for joists from 3 to 4 ft. apart) and adequate slab reinforcement was obtained with standard wire mesh. For joist reinforcement the use of cold drawn wire (No. 6 to No. 0) permitted working stress of 30,000 lb. per sq.in. as compared to 20,000 lb. allowable in steel bars. With the new floor system, steel requirements are reduced by two-thirds, amounting to less than 1 lb. per sq.ft of floor surface as against 3 lb. per sq.ft. for standard 5 in. floor slabs with ½ to ⅝-in. steel bar reinforcement.

At the plant where the new type joists are prefabricated for the Pueblo Del Rio project, comprising 400 family units, reinforcing wire, in coils, is run through straightening rolls equipped with an automatic cut-off which lops the wire to required lengths. Bundles of these wires are transferred to a nearby assembly rack or jig where the wire parts necessary for reinforcing the joists — stirrups, bundle wires and single longitudinal wires for stiffening — are fabricated. Stirrup wires are shaped on punch presses and fastened by spot welding. They are bent into rectangular shapes to which two additional wires are attached.

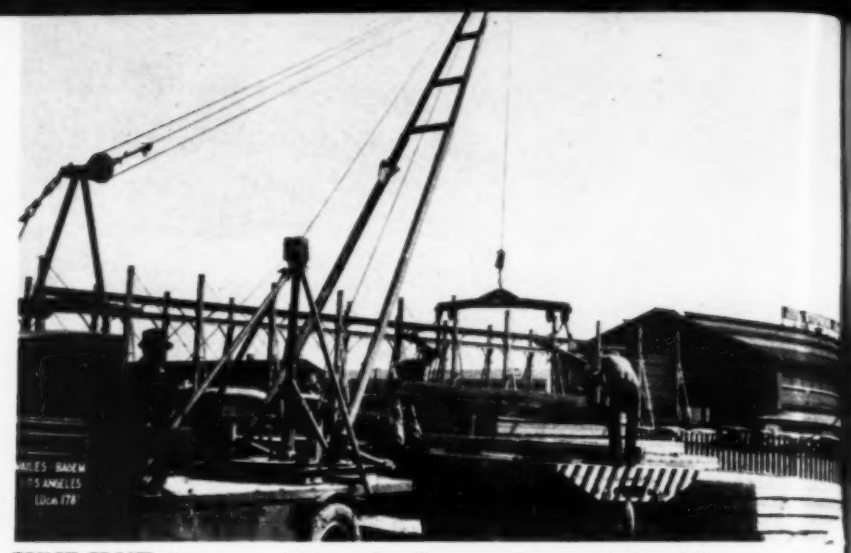


CROSS-SECTION OF PRECAST CONCRETE JOIST showing use of wire for reinforcement.

A curved carrier (for the bundle bars) is formed by putting a No. 6 wire through a punch press, and this carrier and a piece of straight wire that serves as a spacer are spot-welded to the stirrup in a single operation. The spacer (horizontal when in the form) keeps the stirrup centered while concrete is being poured. The curved carriers are supports for the bundle bars up to the time the



ASSEMBLY JIG has steel pegs set at prescribed stirrup spacings. After stirrups are placed on pegs, bundle bars are laid in curved carriers and assembly is fastened together with tie wires.



TRUCK-CRANE lifts seven joists and pulls away from stockpile while semi-trailer used for delivery backs under the load. Truck-crane is primarily for use at the site—here it supplements usual stockpile crane.

REINFORCING ASSEMBLIES are stock-piled near shop door for delivery to housing job.

hardening concrete holds them permanently in place. Curved lower ends of the stirrups provide anchorage in the concrete. Each stirrup wire is split near the top, by a punch press operation, to provide an opening through which a single longitudinal stiffening wire can be passed to hold the assembly in shape during handling and placing in the form.

The jig on which the reinforcing assemblies are put together has pegs on which the stirrup wires are hung while the various component parts are being arranged and fastened. The pegs can be changed for different joist designs. When

Housing Projects
Now Under Construction in Los Angeles
Using Precast Concrete Joists

Project Name	Number of family units	Precast Joists	Total joisted floor area (square feet)	Type of Construction
Pueblo Del Rio	400	6,000	288,000	Brick walls Concrete floors Concrete roofs
Wm. Mead Homes	450	7,200	335,000#	
Aliso Village	802##	7,300	414,000*	Twelve large 3-story buildings**

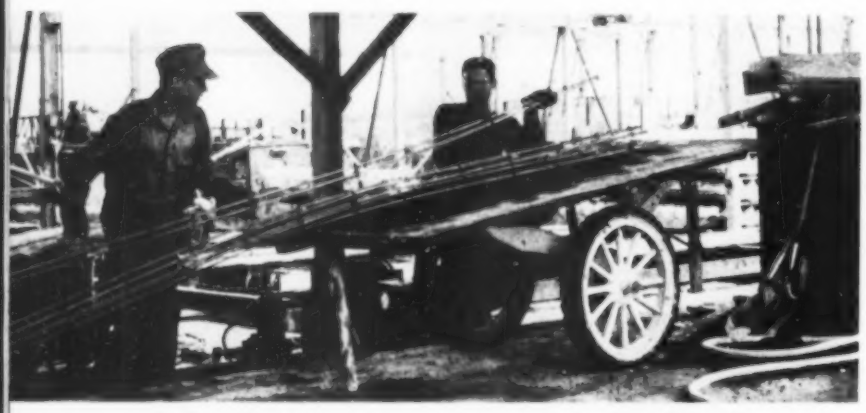
Includes 2nd and 3rd floors and roof

* Includes three floor levels

** Reinforced brick walls, concrete floors, wood roof

21 two-story wood and stucco buildings

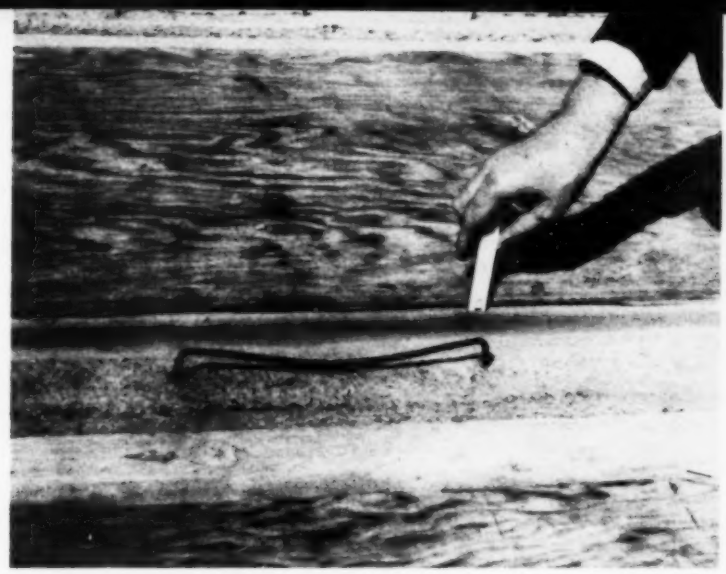
12 three-story masonry and concrete buildings (all 33 have precast joist construction in first floor)



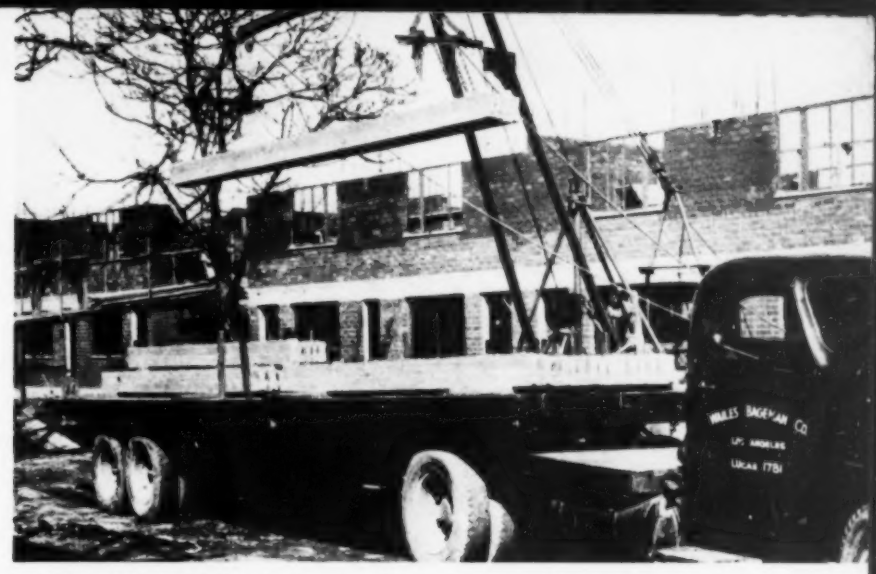
HAND CART delivers assemblies to compaction machine where concrete is poured in joist forms.

THIS SEMI-TRAILER (below), specially built rig with 30-ft. bed, was made long enough to carry two piles, lengthwise, of 14-ft. long joists.

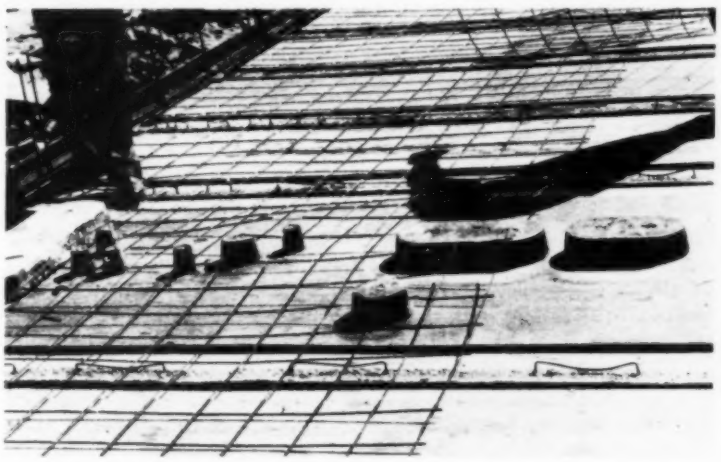
COMPLETED JOISTS (left) on pallets have just been withdrawn from compaction machine. Note stirrups projecting from top, and rough top surface of joists that aids bonding into concrete floor slab.



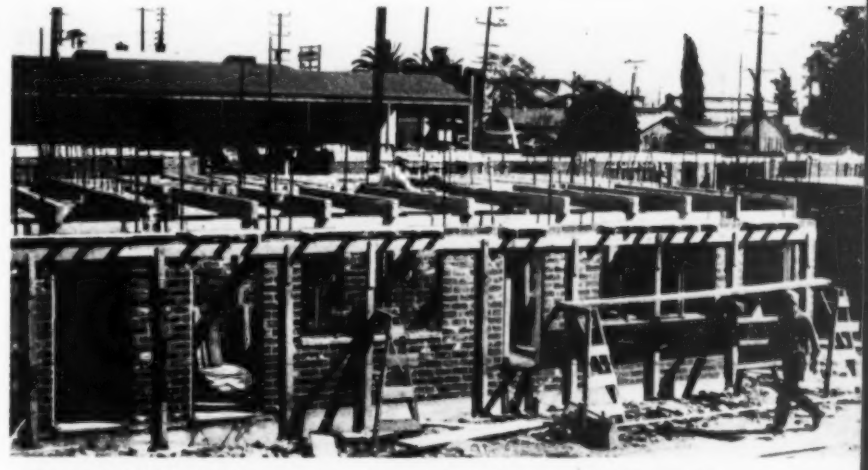
SECOND-FLOOR FORMS provide ⅜-in. additional slab thickness along joists, thus adding strength and giving depressed panel effect in ceiling of first story below.



TRUCK-CRANE TAKES JOISTS from delivery truck, lifts them over walls to second floor whence they are placed by hand in second floor and roof. Joists are lifted by their projecting stirrup wires.



BATHROOM FLOOR FORM carries white pine wood blocks, slightly tapered, glued and bolted to panel where they will form floor openings for utilities. This saves duplicating layout, as floor panel is used repeatedly. Stripping is facilitated by tapping tops of wood blocks, which extend through floor slab.

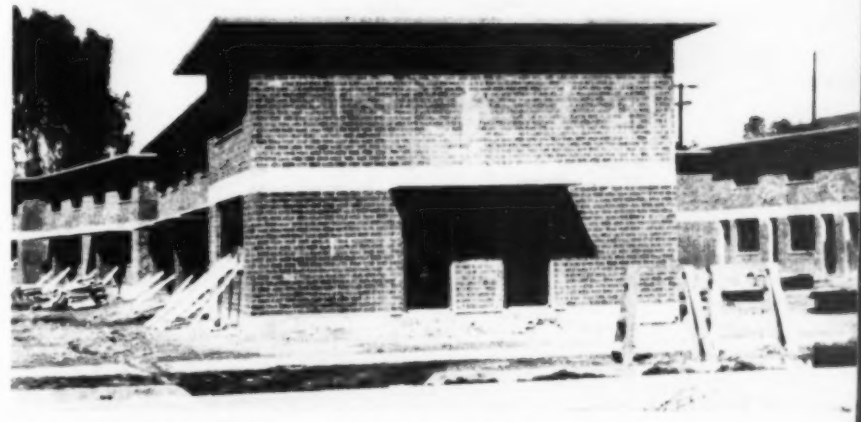


SECOND-FLOOR JOISTS are set and spaced ready to receive forms for second-floor slab.

the bundle bars are placed in their supports and have been secured with tie wires, the longitudinal wire at the top is thrust through the openings formed by splitting the stirrups, and this wire also is fastened to give the assembly rigidity. When all parts are in place, the assembly is lifted off the jig and stockpiled, handy for loading the cart that makes deliveries from shop to compaction table where concrete is poured into the forms and consolidated by vibration.

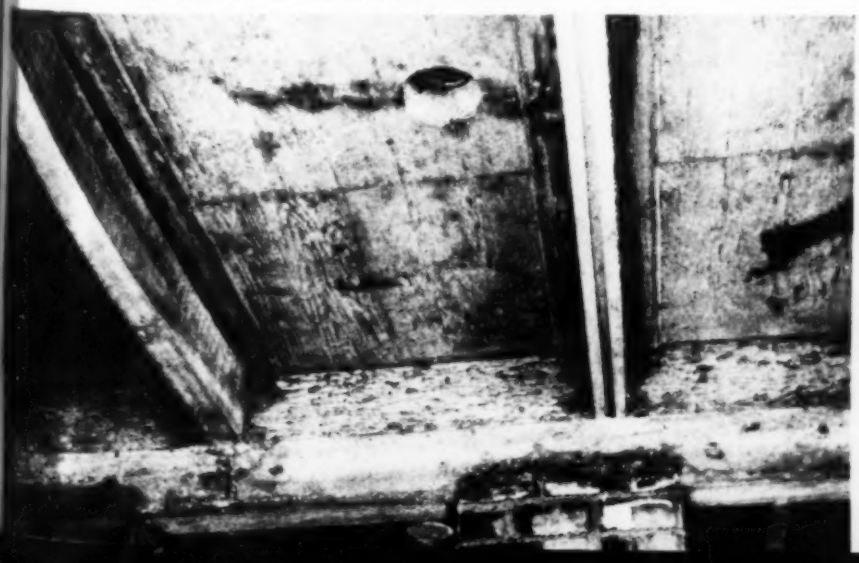
After coming from the compaction machine, precast joists are stockpiled in the yard by overhead cranes until ready to be transported to the job. Shipment is by a semi-trailer built with a bed 30 ft. long to carry two piles of 14-ft. joists. Arriving at the job, joists are delivered from this trailer into place in the building by a truck crane that picks up the joists,

(Continued on page 84)

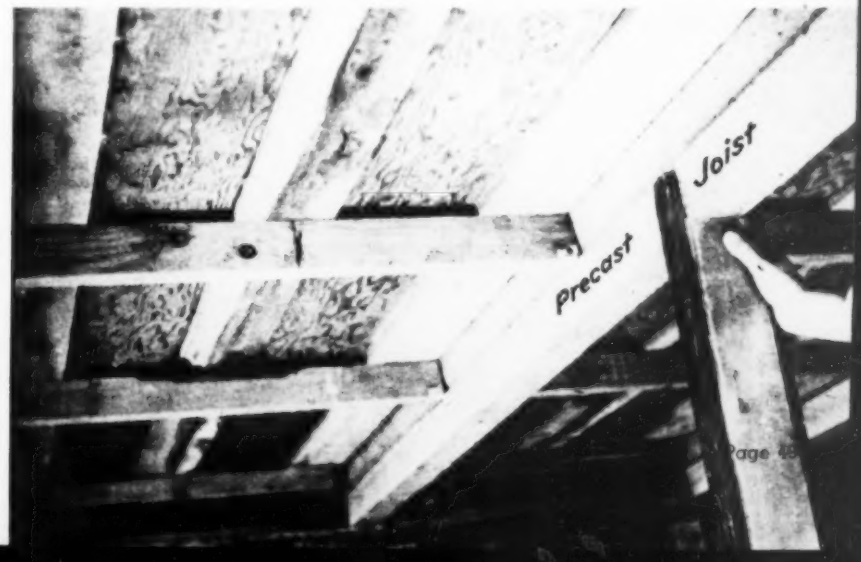


TYPICAL DEL RIO PROJECT structures near completion.

CEILING, FROM BELOW (below), shows two types of joists. Under surface of floor slab becomes finished ceiling. Note utility openings. Grooved joist bottom is to insure tight partition joints.



UNDERSIDE OF FLOOR SLAB (below) shows plywood panel with three 1x6's on transverse purlins resting on ledge of precast joist. With metal ends, purlins can be used repeatedly.



Industrial Bridge

Built to Carry Conveyor Lines Between Plant Buildings

By L. E. OSBORNE

Manager of Manufacturing and Engineering, Merchandising Division, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

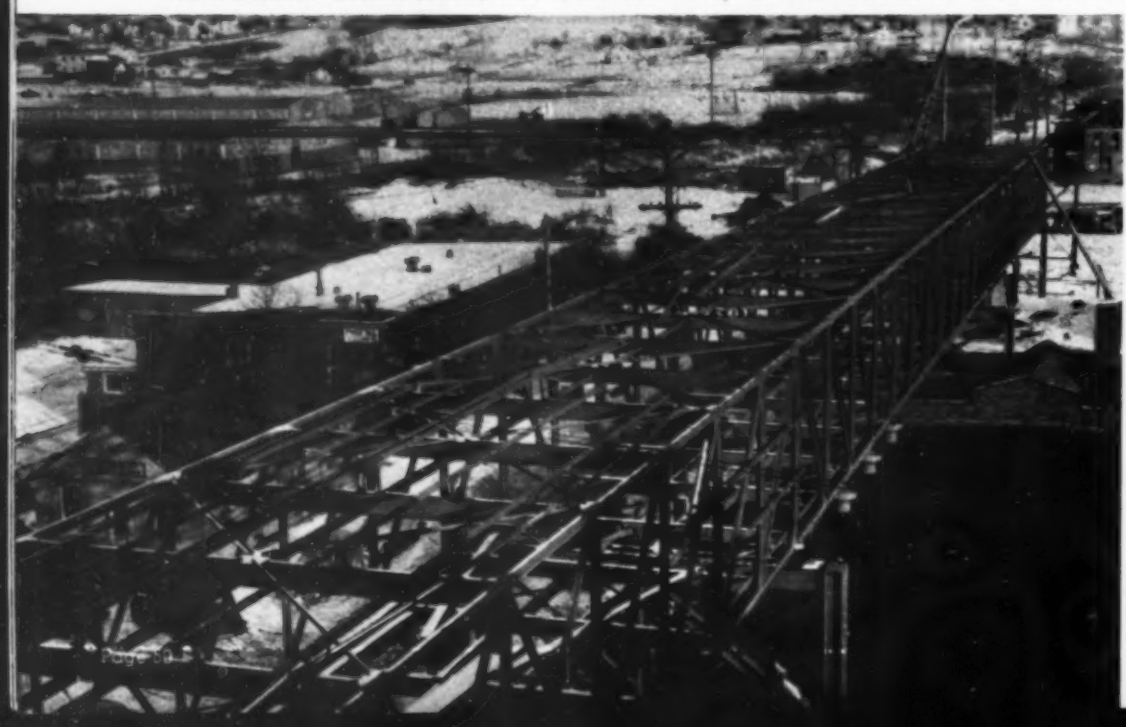
TOWER SUPPORTS for first section of bridge have A-frames along face of existing building and inner columns running through roof of structure.

A NUMBER OF SPECIAL CONSTRUCTION PROBLEMS were encountered in building a new 1,000-ft. industrial bridge to carry three lines of conveyors at the Mansfield, Ohio, plant of the Westinghouse Electric & Manufacturing Co. Despite various difficulties encountered, plus the handicap of severe winter weather, the bridge was constructed and placed in operation in less than five months. The first few days of operation demonstrated that the conveyor bridge exceeded our expectations for smooth, simple and economical handling of materials between our vitreous enamel plant and our main factory building.

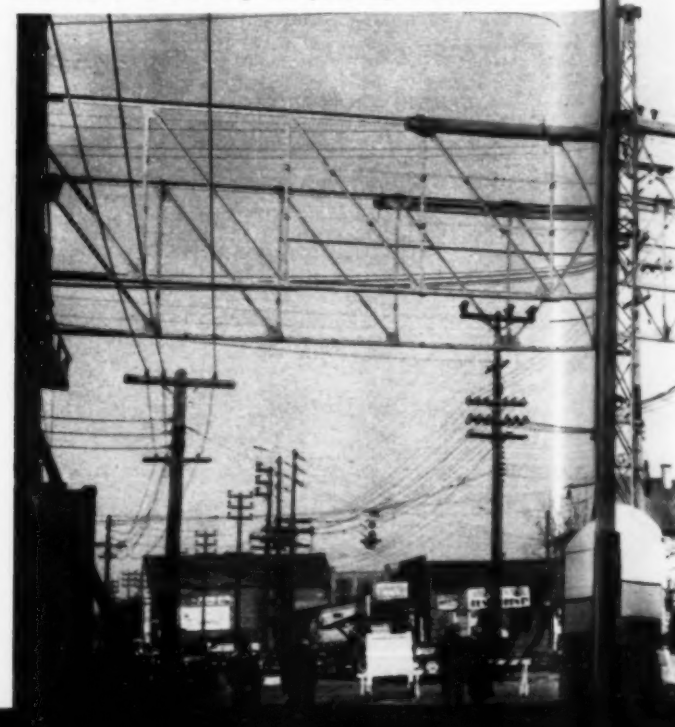
One end of the bridge was to feed directly into the third floor of our main plant, connecting with the start of our range assembly line. This meant, of course, that the end of the bridge had to be fastened to the steelwork of the building. By making this end section somewhat shorter than the others, it was not necessary to add to the footer capacity at the side of the building, as the present steel framework could handle the load adequately. The first length for this reason was constructed 99 ft. 5¾ in. long.

The first section runs from the assembly building to a tower set up on top of a one-story factory building used by a rubber novelty manufacturing concern. The presence of the building made the job of surveying quite difficult, since

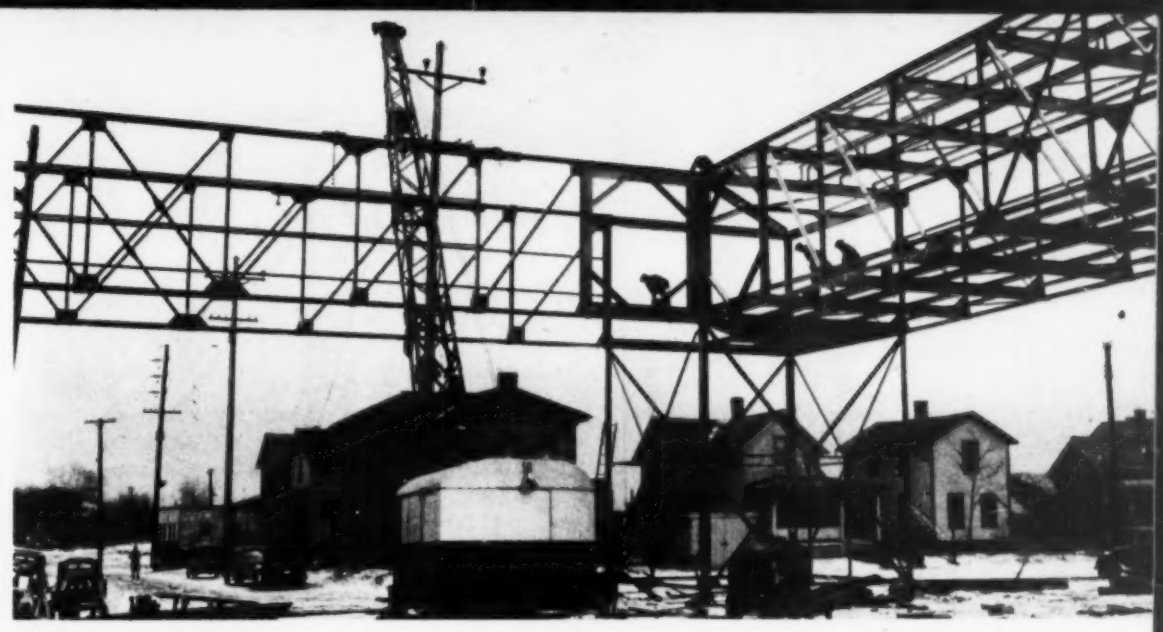
FOR INCLOSING BRIDGE (below) cross beams are set up at 10-ft. intervals on floors and roof.



AT CROSSING OF CITY STREET (below) trusses, stiffened with 8x8-in. timbers 40 ft. long, are raised 30 ft. and swung into place by crawler



ROOFING AND SIDING of corrugated metal with protective weather coating inclose bridge completely. Continuous windows provide light on both sides of structure.



WHERE BRIDGE MAKES TURN special construction is employed to enable roller conveyor line to negotiate right angle in two 45-deg. stages.

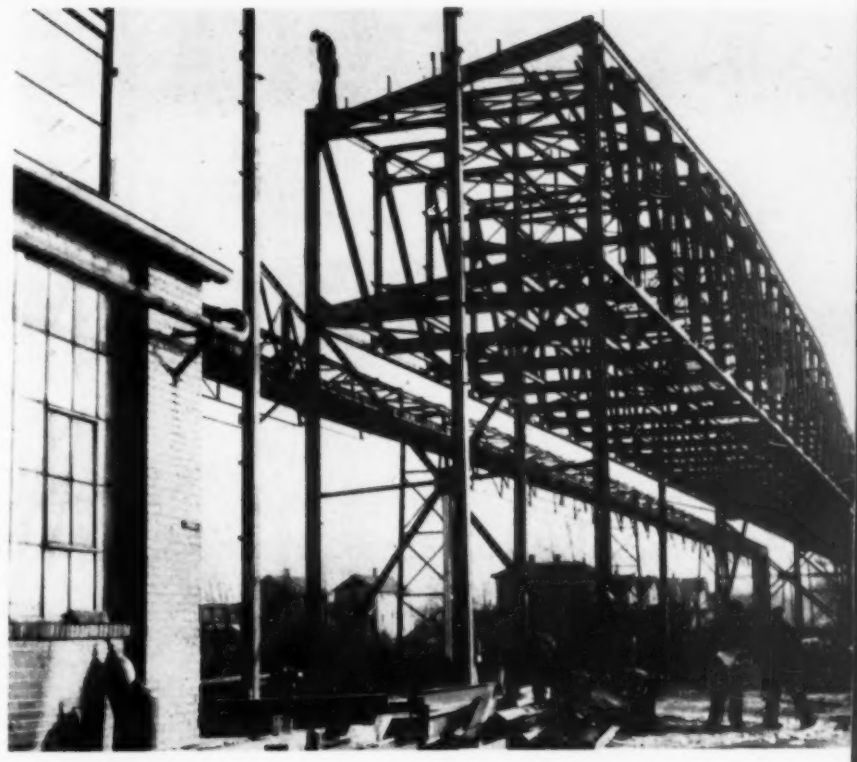
one column of the tower had to run directly through the rubber plant's building. Theoretically both columns of the tower should have been A-frames, as is the one directly against the side of the building. However, since it was to run directly into the building, a single column was used and cross-bracing was worked out which equalized stress on the single column and A-frame and prevented sway.

The second tower is identical with the first and again the single column had to enter the building. However, in this case, the single column went down to a basement, 8 ft. lower than the concrete floor on which the single column of the first tower was placed.

In both towers, the A-frames came close to the wall of the building. Naturally, to get sufficient footer, it was necessary to underpin this wall to place as much footer under the building as was extended out the other way. Incidentally, all the bridge sections were brought to the scene of construction already fabricated. In the case of the towers running down into the building, and in every other case, there was a perfect fit and when the frames were set down on the footers over the anchor bolts, no re-drilling was required. Absolute level was attained on each tower.

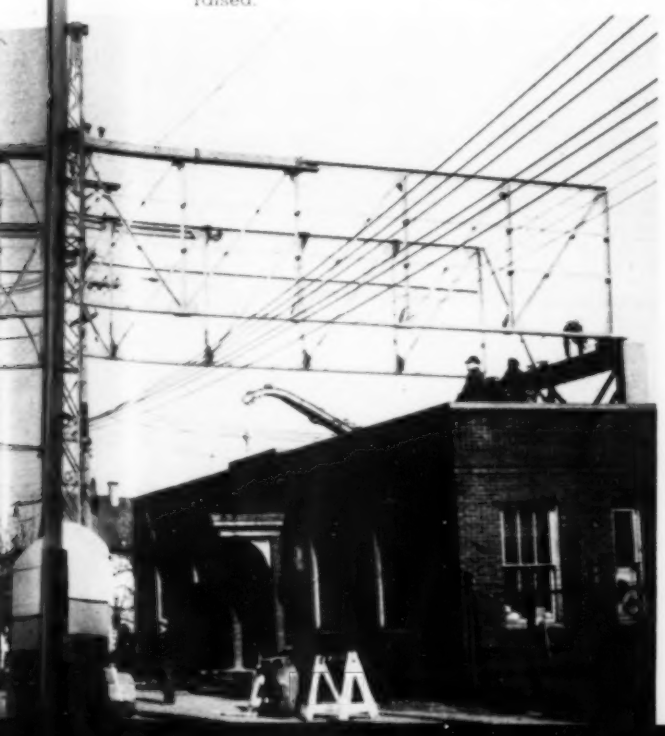
The first bridge section passes directly across a city street

(Continued on page 113)



SPAN OF 185 FT. is required for section near enameling plant where bridge crosses creek and railroad.

crane without cutting overhead power lines along street. Each truss comes in two sections which are assembled in street before being raised.



INCLOSED BRIDGE (below) carries one roller conveyor and two tracks of overhead conveyors with suspended baskets. A 6-ft. aisle provides passageway for electric trucks and pedestrians.

BIG ALL-STEEL PILEDRIVER, equipped with 90-ft. leads, puts down first unit of 60-ft.-long Z-type sheetpiling. Steel I-beams forming base of rig are shod with 3-in. thick hardwood strips, greased for easy skidding to new setups.

Rolled Earth Fill Forms 2,500,000-Cu. Yd. Sepulveda Dam For Flood Protection At Los Angeles

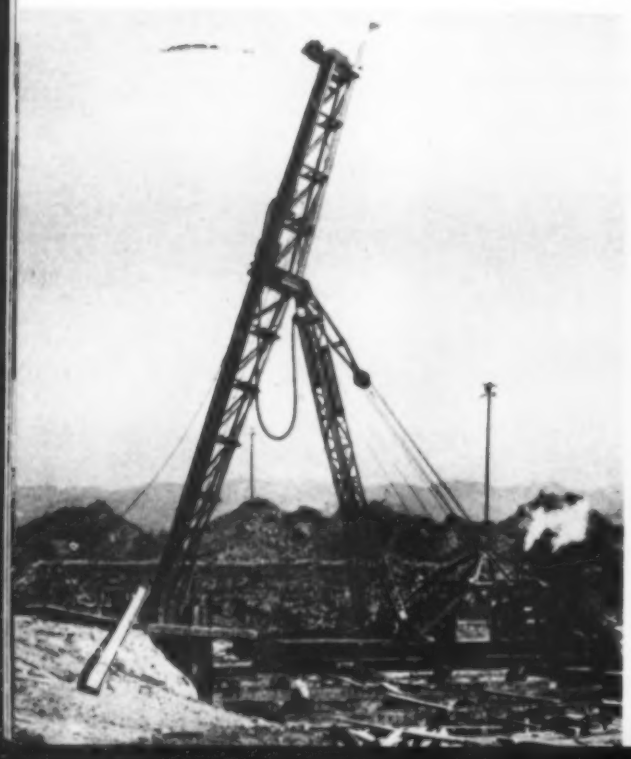
Photos, Floyd Suter Bixby

COMPLETED RECENTLY under the direction of the U. S. Engineer Department, Sepulveda Dam is a rolled earth fill across the Los Angeles River, designed for flood control in the area of Los Angeles, Calif. The structure is 15,000 ft. long on its crest, has a maximum height of 50 ft. and contains 2,500,000 cu. yd. of compacted embankment, with a 3 on 1 slope on the upstream and a 4 on 1 slope on the downstream faces. On a low bid of $3,121,000, contract for constructing the dam was awarded in February, 1940 to Jahn-Bressi-Bevanda Constructors, in association with Joseph A. Dowling and David G. Gordon. For completion of the project 540 calendar days were allowed. Work was done under the direction of Lt.-Col. Edwin C. Kelton, district engineer at Los Angeles for the U. S. Engineer Department.

A separate contract for the relocation of about 16,000 lin. ft. of outfall sewer was let to Artukovitch Bros., of Los Angeles. The general contractor subcontracted various items of the work. Piledriving was sublet to the Tavares Construction Co. of Los Angeles, whose specially built all-steel piledrivers aroused much comment among construction and engineering executives in southern California. An earth-moving subcontract for 1,000,000 cu. yd. of stripping and common excavation was let to T. M. Page of Pasadena. The general contractor handled all the earth embankment, comprising 2,500,000 cu. yd. of impervious material in a single zone. Concrete pouring operations were also handled by the Jahn-Bressi-Bevanda organization. Steel reinforcement was furnished and installed by the

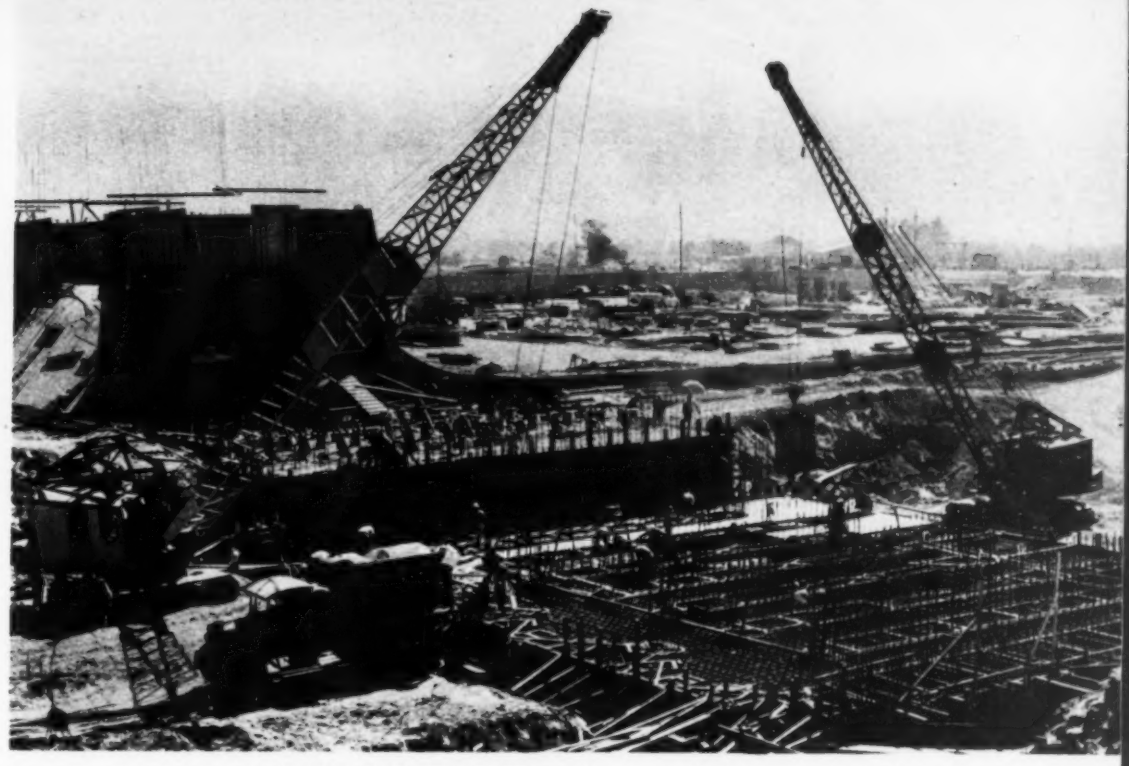
(Continued on page 124)

FOR DRIVING BATTER PILES (below) base of rig is equipped with steel H-beam which pushes bottom of leads out to produce desired slope.



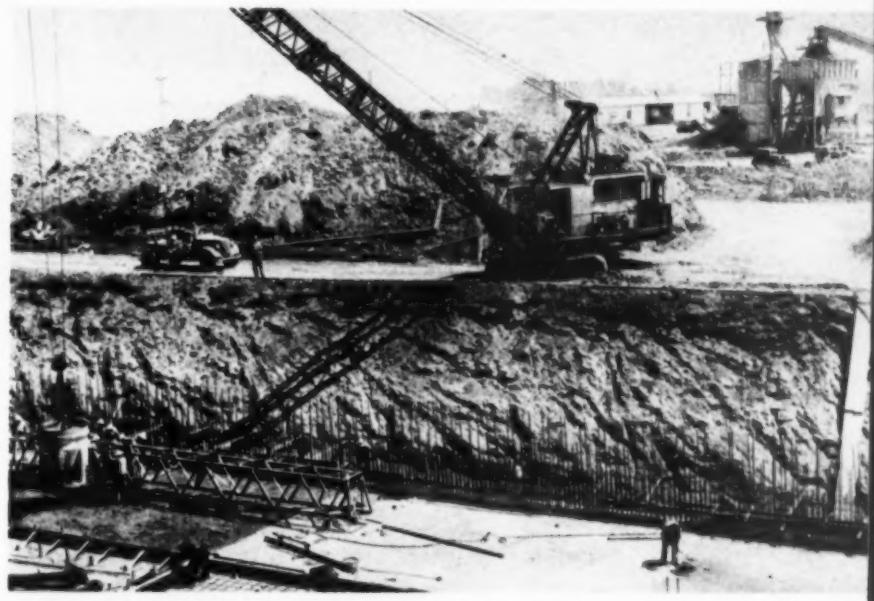
COMPACTION OF EARTH FILL (below) after it has been sprinkled to obtain optimum moisture content, is done with Kay-Brunner sheepsfoot rollers weighing 2,200 lb. per lin. ft. of tread. Each roller covers strip 22 ft. wide, operates at speed of 2½ mph., and makes eight passes to consolidate fill in 6-in. layers.

STRIPPING OF FOUNDATION AREA of dam is done with LeTourneau carryall scrapers hauled by Caterpillar D8 tractors. Pusher tractor speeds up loading of 25-cu.yd. scraper. Stripped material is wasted in designated areas or in borrow pit after excavation is completed for adjacent section of dam fill.



LARGEST CONCRETE POUR on job requires 2,000 cu.yd. in base of outlet structure. Transit-mix trucks supplement concrete delivery in 3-cu.yd. buckets by Ford trucks. Concrete buckets are here shown being handled by Koehring and Northwest cranes. Steel bearing piles support concrete substructure for outlet works of dam.

13-CU.YD. LOAD OF FILL for main body of dam arrives from borrow pit in one of fleet of Euclid wagons, powered by Cummins diesel engines. Wagons operate over 2,200 ft. long haul road from borrow pit.

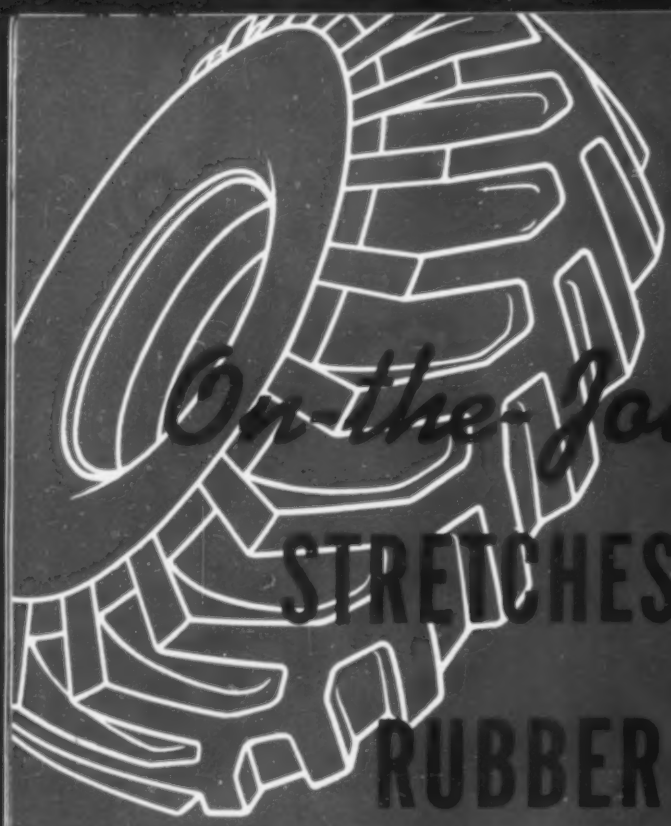


INVERT SLAB of outlet structure receives concrete in bottom-dump buckets delivered from central mixing plant (in background) by Ford trucks and handled by crawler crane.

DUMPED FILL is leveled off into 6-in. layers before watering and rolling by motor patrol grader.

MANY OF SHEETPILES (right) were lined up and driven by hammer on P&H crawler crane. In trench centered exactly on pile row 12x12-in. timbers were set to form channel for guiding piles to perfect alignment.

IN BORROW PIT (below) earth for dam fill is loaded into 13-cu.yd. Euclid wagon by Caterpillar elevating grader towed by D8 tractor.



On-the-Job Maintenance STRETCHES LIFE OF RUBBER TIRES

RICHARD E. BOLTON

By RICHARD E. BOLTON, *Field Engineer, The Goodyear Tire & Rubber Co., Inc., Akron, Ohio*

RUBBER TIRES ON CONSTRUCTION EQUIPMENT will last just about as long as management is determined they should. To obtain maximum service, it is necessary only that they be handled with the consideration due large tires, costing hundreds or even thousands of dollars. Too often habits acquired with light passenger-car tires, which were inexpensive and easily replaced, have conditioned the thinking on large tires, despite the fact that a single large tire may cost as much as the whole car on which those passenger tires were running. The difference is worth some thought, especially in these days of a perilous rubber shortage.

Rubber no longer flows from a seemingly inexhaustible well; today the bottom of the well is in sight. To carry their share of the war effort, tires now available *must move more dirt*, very important dirt, *than tires ever moved before.*

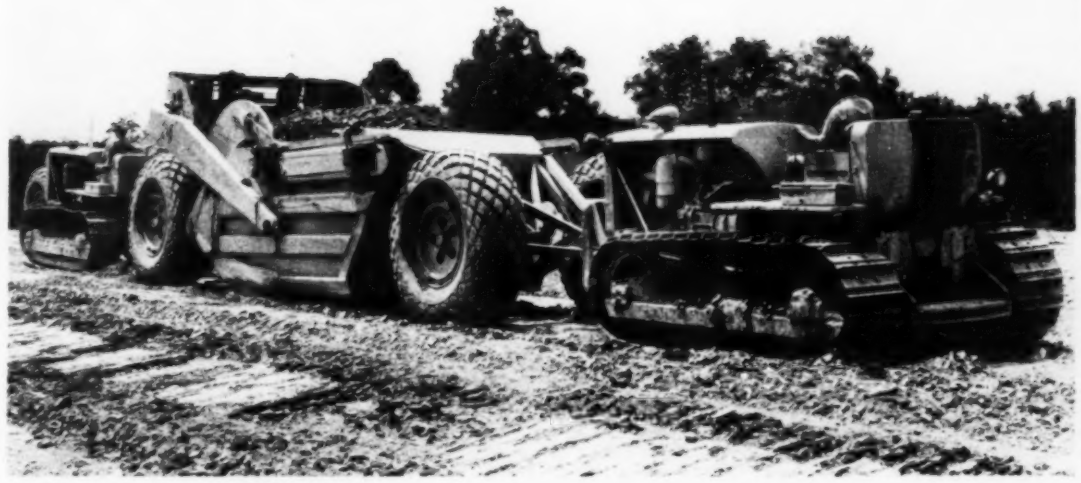
There is a way to stretch the life of tires on construction equipment. That way is to apply to tire maintenance the same aggressive management and vigilant supervision that have so brilliantly outstripped production schedules for Victory construction in recent months.

To make the stockpile of vital tires stretch further, the construction operator must face the fact that he needs an experienced tire man on the job. When contractors were changing over to diesel power a few years ago, it was accepted good practice to get in a diesel mechanic or train one to become more intimate with the new tool.

Supervision and upkeep of tires today cannot be left to odd-job men in the shop or lubrication crews. The management on each construction job should put the supervision of rubber tires in the hands of one good man. If the construction organization does not possess such a man, those in charge can ask their tire supplier to recommend an individual

IN DEEP-YIELDING MUD AND CLAY (below), imprint of widely spaced bars on mud tires shows how self-cleaning characteristic of tread design helps to keep lugs clean for effective bite into ground on each revolution. Tread on mud tires is designed to produce mechanical gearing action by penetrating soil with wedge-shaped lugs and forming (between bars) blocks of material with broad bases to resist shearing.

FOOTPRINT OF EARTHMOVER TIRE (below), used on scrapers and other trailed equipment, indicates ability to hold on side slope and maintain even blade for finishing operations. Earthmover tires have overall tread design extending out on to shoulders and sidewalls. Medium spacing of treads provides protection to carcass and undertread but assures sufficient traction to work on slopes.



REAR TIRES must be kept away from pusher plates and from blades on bulldozers used as pushers. Accidents between rubber tires and steel blades are seldom repairable.

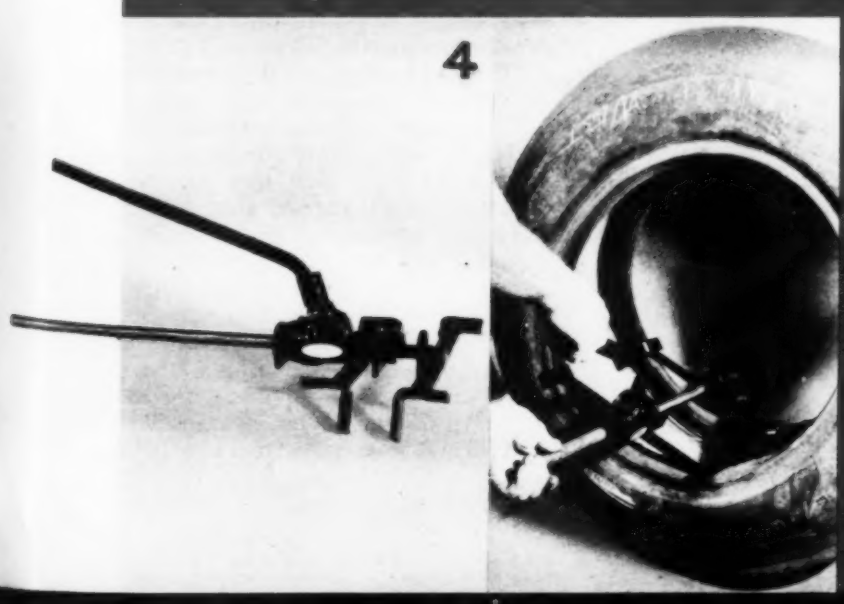
PUSHER BLADE was responsible for bad cuts on this rear tire, which has been damaged beyond repair.

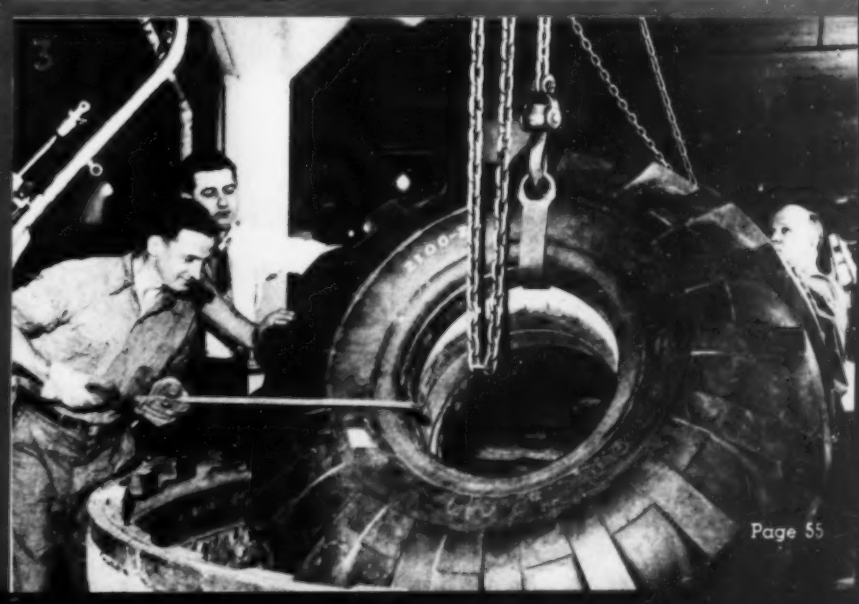
1 **FOR SOFT GOING,** inflation must be kept uniform and within maximum specification to assure ample ground contact area (flotation) for supporting load.

2 **OVERINFLATION OF DRIVE TIRES** on tractor-scraper unit increases tendency of these tires to spin. Operator should depend upon pusher to do most of loading, using just enough power on his rubber-tired tractor to keep straight pull on drawbar.

3 **FOR REPAIR** of large off-the-road tires, kettle plants have been developed and located at strategic points throughout the country. By use of one of these kettles, large number of cuts around circumference of tire can be repaired in one cure.

4 **FOR INSPECTION** of large tires in field, heavy-duty portable spreader which works like bumper jack is useful tool.

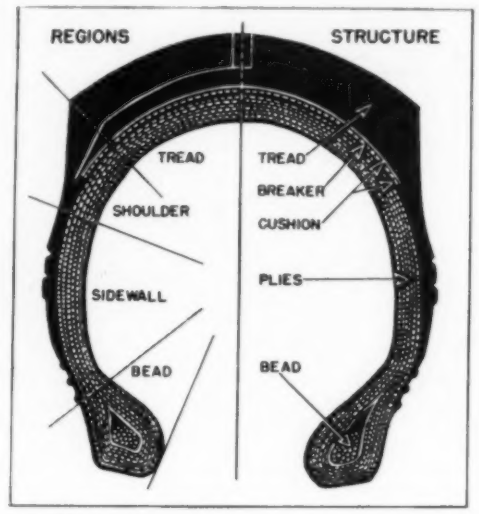




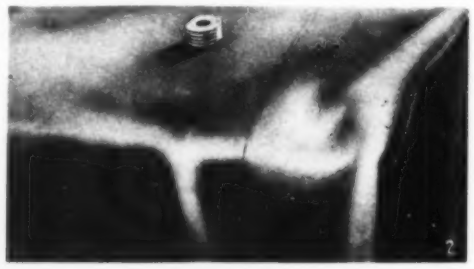
FOR FRONT WHEELS and leaning wheels of power graders, ribbed tire with wide spacing between ribs and heavy shoulder construction helps to hold machine on slope, in ditch, or to straight course against side thrust of blade.

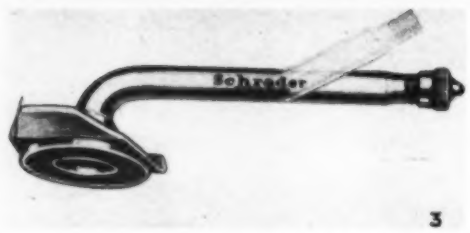
MUD TIRES are used largely on drive wheels of self-powered tractor-wagon and tractor-scraper units. Note wide spacing of bars on these tires as compared with tread design on rock type.

PORTABLE SERVICE STATION saves time and tires by taking service to area in which earthmoving equipment is working, thus reducing deadhead mileage. Mobile station supplies lubricants, water and fuel for machines as well as air and parts for tire service.



CROSS-SECTION OF TIRE, from War Department Technical Manual TM 31-200 Preliminary, indicates construction of casing and proper nomenclature for various parts.





DAMAGED STEMS of cured-in and cured-on valves can be removed and replaced by this simple procedure: (1) With all fittings removed from old valve, holding tool is screwed down on body threads of base until tool seats lightly on old rubber base or tube surface. (2) Tool handle is clamped in vise to permit valve to be cut off along surface of tool; when tool is removed, it refinishes threads, leaving threaded butt as shown. (3) Proper size repair valve is applied to prepared butt of original valve and is screwed down firmly against tube or rubber base of valve.

TIRES OF ROCK TYPE, used on rear wheels of this end-dump truck in rock service, can be used on front as well, although practice is about evenly divided. Rock tires give from 33 to 75 percent greater service than highway types in rock work, but they do cause some extra steering fatigue in certain kinds of operations.

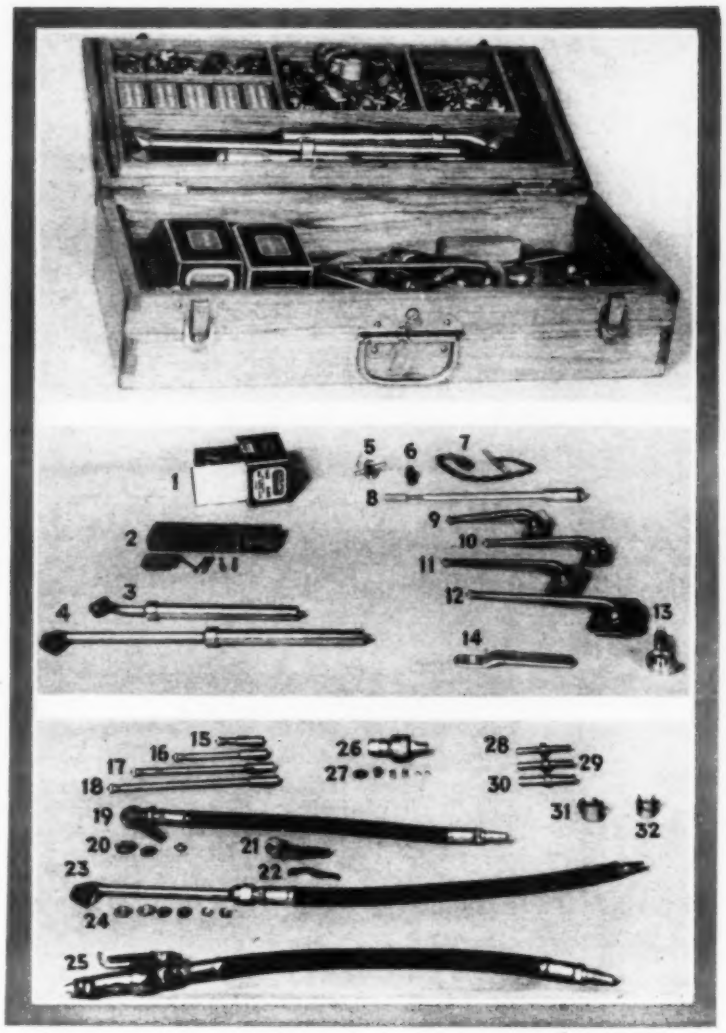
who knows how to keep them rolling. Once a capable man has been selected for the responsibility, he must be given the tools with which to work.

For the supervisor delegated to do this all-important job, the following notes outline the principles of tire maintenance and the tools needed.

Application of Tires

Longer life and greater service may be obtained from rubber tires by observing the following rules:

1. Apply new tires in pairs on dual wheels.
2. On dual wheels, keep tires evenly mated by actual overall diameter. Differences greater than ½ in. in diameter are bad for the tires. It usually is possible to put odd tires on single fronts or other single-tired wheels.
3. Tandem grader wheels likewise must be mated to the same ½-in. tolerance, as these machines usually have no differentials to compensate for unequal rolling radii. If a new tire has to be mounted with three old ones, add 5 lb. to the air pressure in the old tires and run the new tire at a pressure 10 lb. under this increased pressure in the old tires.
4. When applying tires to rims, keep a cap on the valve to protect the soft metal of the valve threads.
5. All rims should be cleaned with a wire brush before the tires are applied.



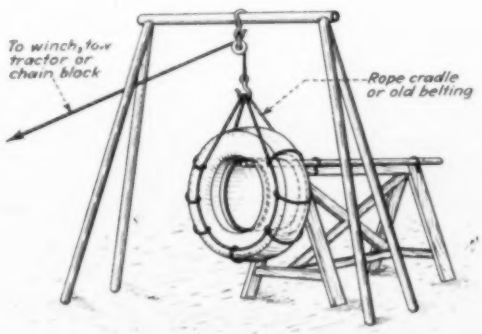
NEW FLEET KIT contains in one compact package all standard parts required for field service of off-the-road tires. Kit supplies everything except rim and wheel tools. Contents include: **(1)** valve caps, **(2)** valve cores, **(3)** service gage, **(4)** dual foot service gage, **(5-8)** valve service tools, **(9-13)** repair valves, **(14)** valve holding tool, **(15-18)** valve extensions, **(19)** air chuck hose with adapters, **(20)** replacement parts for air chucks, **(21** and **22)** air chuck clip and replacement parts, **(23)** dual foot air chuck hose with adapter, **(24)** replacement parts for dual foot air chuck, **(25)** blow gun, **(26** and **27)** quick-acting coupler and replacement parts, **(28-30)** hose repair couplings, **(31** and **32)** hose clamps.

Use no oil or grease on rims. Graphite mixed with glycerin or water is the best rim dressing.

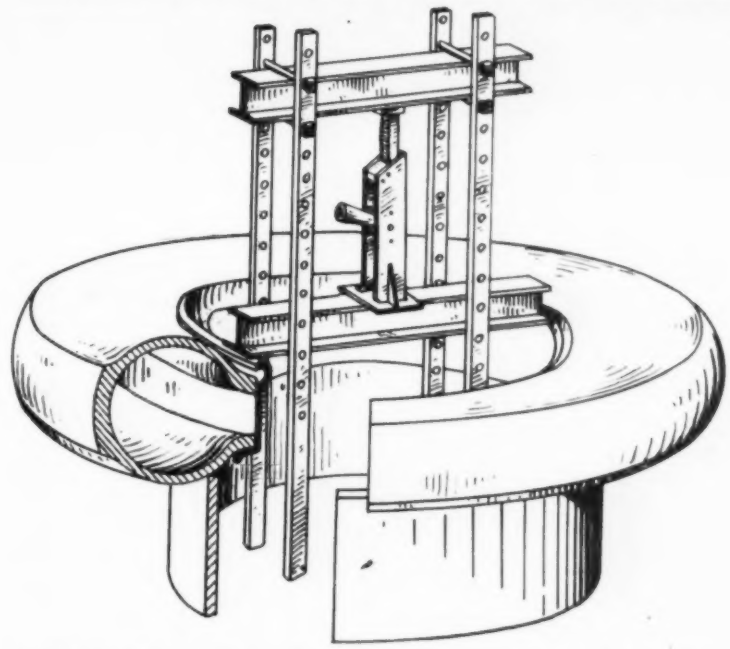
6. Bent rim flanges should be straightened to give full support to the bead of the tire.
7. Don't use old flaps or tubes with wrinkles in them.
8. When tires are to be mounted, all foreign material should be cleaned out of the inside of the casing. Make sure no gloves, pieces of steel or other materials get in the casing.
9. Where large tires have to be mounted on rims which are not demountable from the wheels, use a large A-frame with a rope cradle to raise the tire to the level of application. Don't use chains or cable cutting in around the bead area of the tire to support its weight. As an alternate to the A-frame, a greased drip pan placed on the ground so that

(Continued on page 72)

ROPE CRADLE (right) is used with hoist rig to mount tire on rim. This equipment is particularly useful in putting tire on rim which is not demountable from wheel. Alternate method is to slide tire over greased pan on ground.



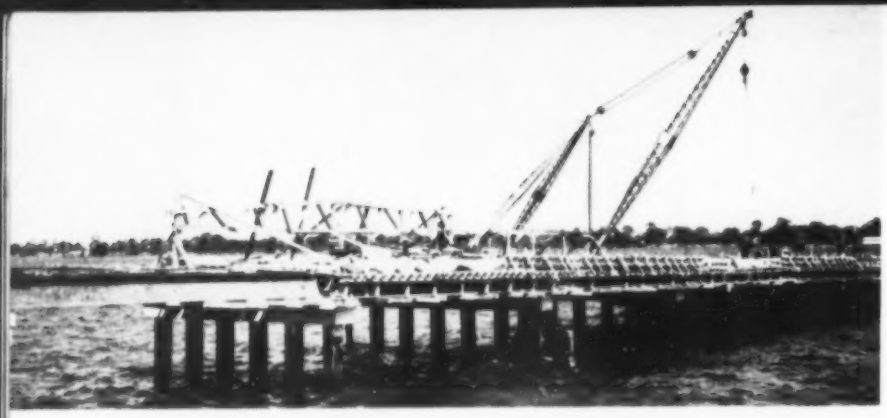
ROCK TIRES used on drive wheels of this dumptor have heavy tread and sidewall bars to resist sharp rocks and snagging. This design gives maximum protection to undertread.



HOME-MADE JIG facilitates dismounting of large tires from demountable rims. In this view, tire and base are cut away to show how pressure is applied to rim after lock ring has been removed. First step in procedure is to apply power through jack and cross-beam to removable lock ring to get it off. Pressure next is applied against rim base, as shown, to loosen back flange of rim from tire.

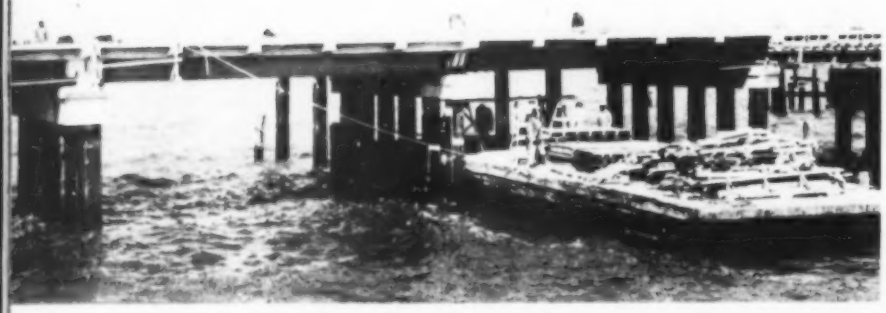
RESEMBLING MUD TIRES (below), drive tires for graders have lighter internal construction because they are not load carriers.

Long Causeway



CONCRETE DECK for typical I-beam spans is placed on wood forms supported by timber joists hung from lower flanges of beams. Set up over nearest span is portable timber frame used to support tarpaulins when needed to protect concrete from weather.

SIX LINES of I-beams carry reinforced-concrete roadway and sidewalk. Ten-pile bent in foreground has special reinforced-concrete cap providing location for automatic traffic barrier which rises out of deck when swing span opens. Note waterproofing on piles of this bent and of typical six-pile bents at right.



BARGE-MOUNTED SCAFFOLD serves workmen stripping deck forms from underside of completed slab.

DECK SLAB is placed on one span at a time. In foreground, steel reinforcement has been set in preparation for placement of concrete.

TRAVELING ON CONSTRUCTION TRESTLE at Sykes Creek, crawler crane lays its own deck with timber mats on wood-pile bents. Above cab roof is auxiliary double-drum hoist used to handle jet pipes when crane is driving concrete piles. From his position above cab roof, operator of this hoist has unobstructed view of jets.

SUPERINTENDENT directing work for Cleary Bros. Construction Co. is J. H. LANGFORD.

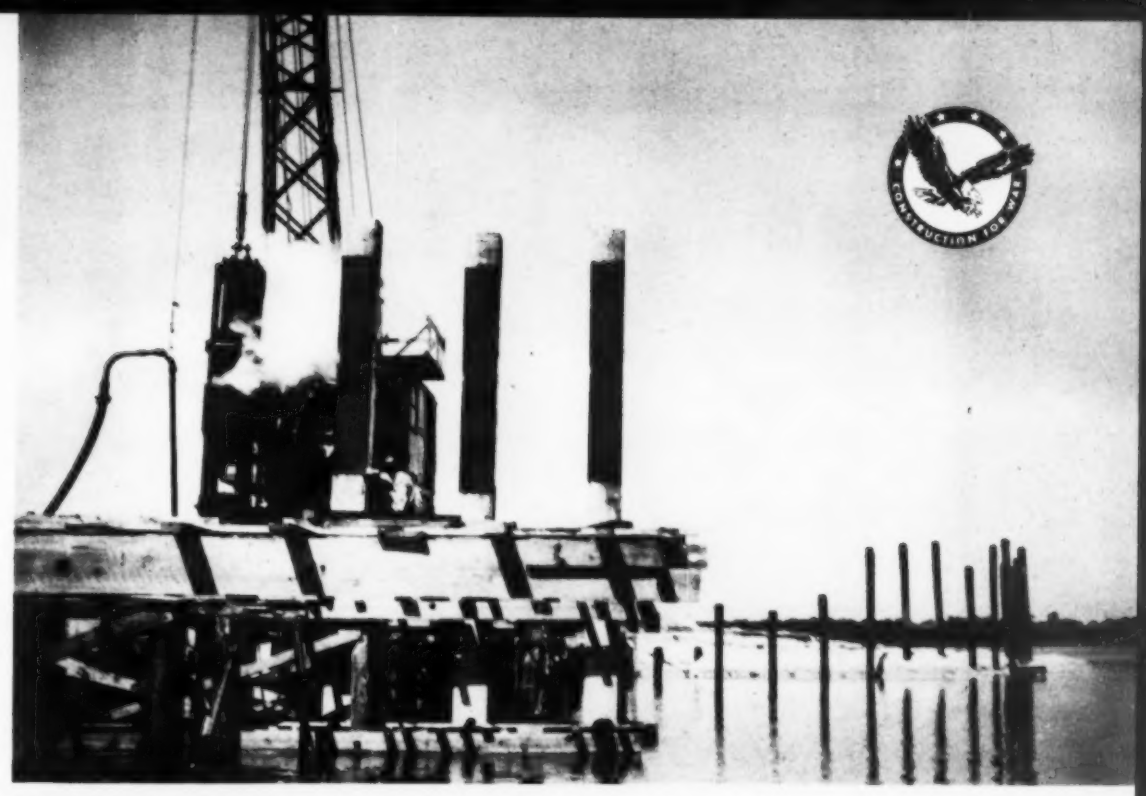
INDIAN RIVER BRIDGE is built under supervision of E. F. BLANKENSHIP (left), superintendent, T. A. Loving & Co., and D. M. ROBERTS, project engineer Florida State Road Department.

STARTING INSPECTION TRIP (below) to Banana River bridges. ROBERT L. RIGGS, project engineer, fits outboard motor to stern of Suste Q. In background is 15-in. diesel dredge Dade which pumped more than 1,000,000 yd. of fill for causeway.

FENDER SYSTEM (below) of treated timber protects main pier of swing span in Indian River bridge.

and Bridges

STRAIGHTEN HIGHWAY TO U. S. NAVAL STATION



PRECAST CONCRETE PILES are driven without leads by single-acting steam hammer and jets hung from boom of Cleary Bros. crane

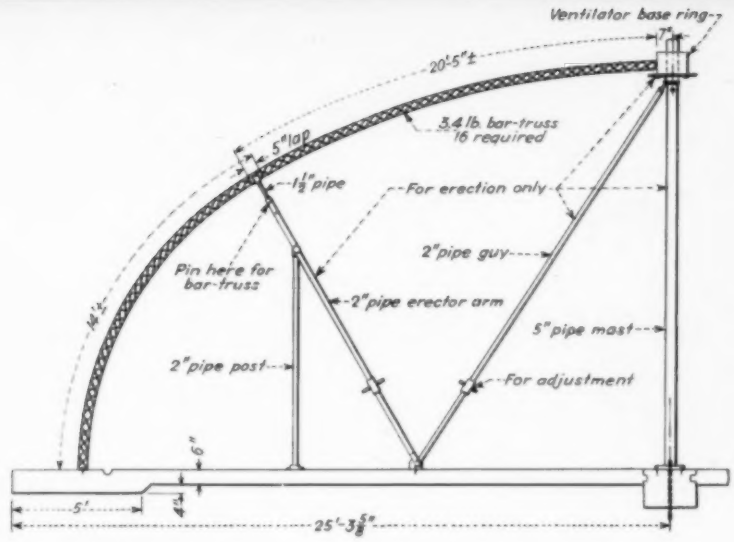
AT JOB CONFERENCE to discuss two contracts of Cleary Bros. Construction Co., V. R. GORHAM (left), vice president, consults URIEL BLOUNT (center), project engineer on causeway fill, and ROBERT L. RIGGS, project engineer on bridges.

SPECIAL RIGGING of stiff-leg derrick gives straight lift on improvised boom in picking up heavy plate girders for Indian River swing span.

TO REPLACE AN INADEQUATE EXISTING SECTION of Florida State Road 70, which followed a tortuous route in crossing two coastal waterways and an intermediate island to a long sand bar where the Navy Department has built a shore establishment, the State Road Department relocated the highway on a practically straight line running east from the mainland town of Cocoa and awarded contracts for five concrete pile bridges and 4½ mi. of hydraulic fill causeway on the new location. Pumping of 1,000,000 cu.yd. of hydraulic fill was completed by the Cleary Bros. Construction Co., West Palm Beach, Fla., and a bridge 1,340 ft long across the Indian River from Cocoa to Merritt Island was constructed by T. A. Loving & Co., Goldsboro, N. C. This bridge includes a 225-ft. swing span which provides two

(Continued on page 96)

FLOATING DERRICK (below) excavates center pivot pier for Banana River swing span



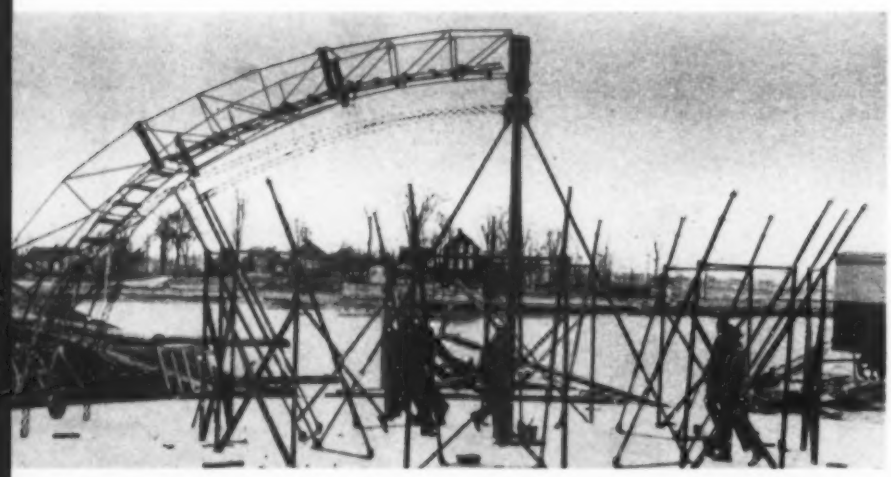
PREPARING TO CONSTRUCT (left) beehive dome on concrete foundation slab, erectors first set 5-in. pipe mast on center pin and assemble traveling carriage which rotates about top of mast.

TEMPORARY MAST and radial erector arms support open-web truss ribs of reinforcing cage. After cage has been completed, same erection units are used to support inner forms of beehive dome.

Full-Scale Tests Develop Building Technique for Army's

Beehive Magazines

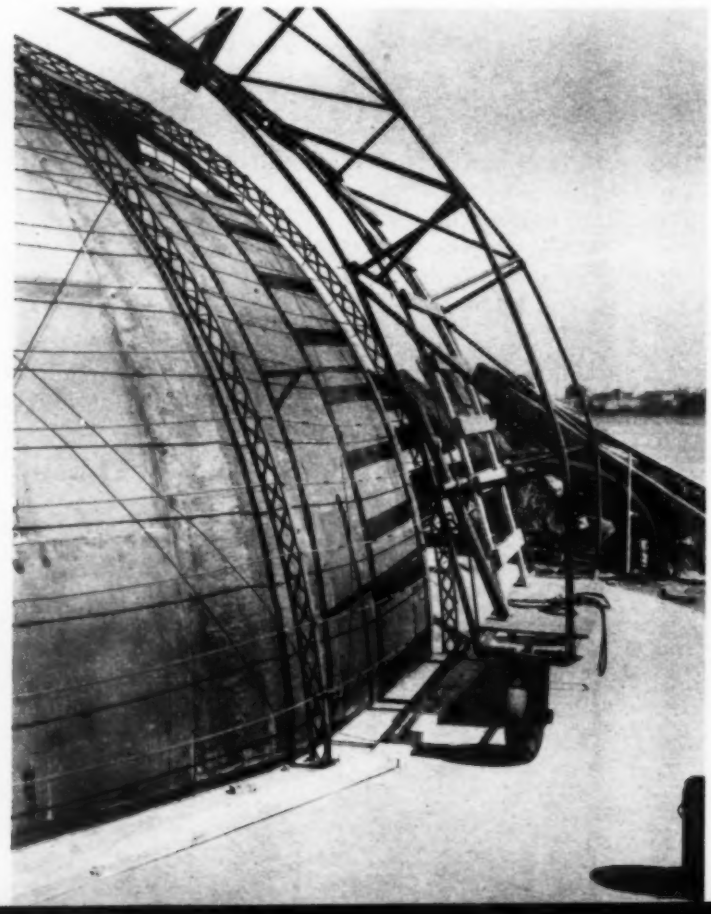
Designed by Contractor to Save Steel and Concrete

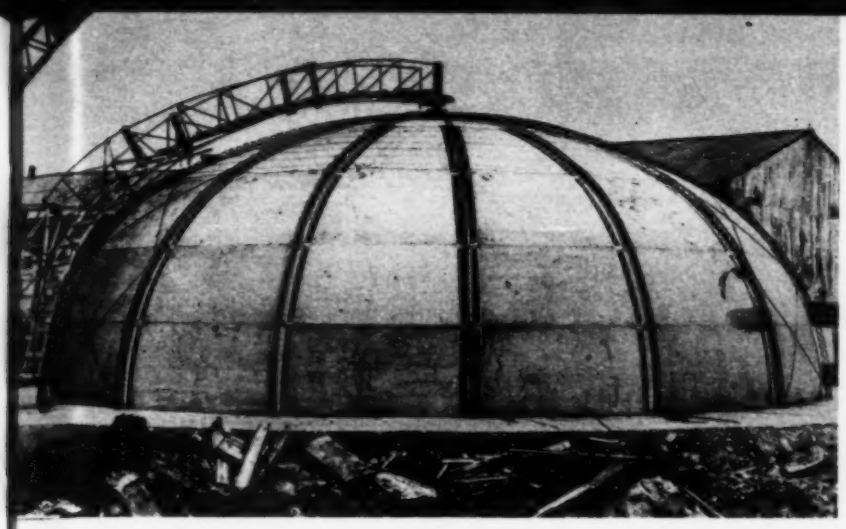


RADIAL ERECTOR ARMS to support open-web rib members of reinforcing frame are fastened to anchor bolts previously located in base slab.

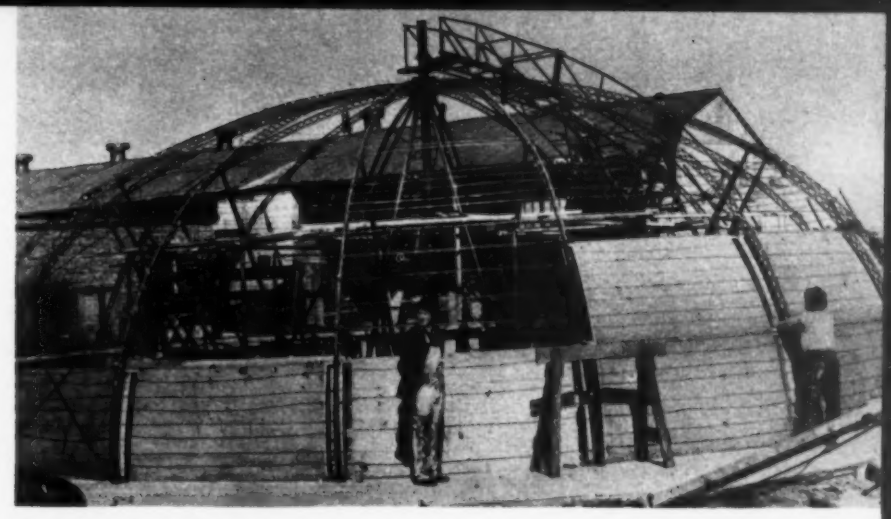
TRAVELING CARRIAGE (below) rotating about temporary mast provides mobile scaffold for workmen erecting ribs and horizontal wires of reinforcing cage.

CIRCUMFERENTIAL WIRES (below) in straight chord lengths are welded to open-web ribs of reinforcing frame.

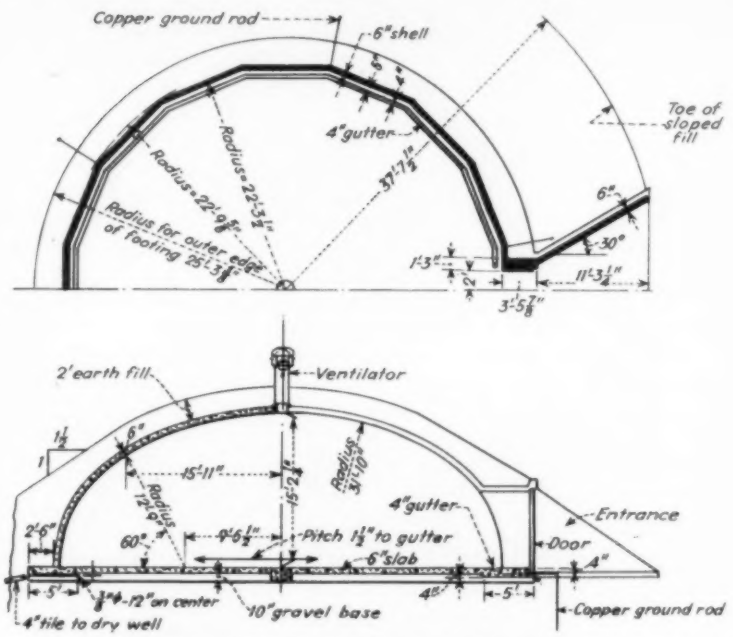




INNER FORM of wood panels is completed to top of dome. Form is supported inside by erector arms, wood shores and umbrella ring at top of temporary center mast.



WOOD PANEL FORMS of type developed through practical experiment are erected for inside of dome. Forms are designed for repeated use.



BEEHIVE STORAGE MAGAZINE is thin-shell polygonal dome which rests on, but is not attached to, concrete foundation slab. Load distribution permits beehives to be placed on soils with bearing value of 2,000 lb. per sq.ft.

FIVE SOLID WEEKS OF PRELIMINARY EXPERIMENTS prepared the Corbetta Construction Co., New York City, to demonstrate the economies of mass production in building multiple units of the Corbetta "beehive" storage magazine, recently adopted by the War Department as an alternate to the standard semicylindrical, "igloo" type magazine. Economical design of the beehive magazine, which reduces the need for steel and concrete by employing a thin-shell dome, led to acceptance of the alternate plan by the Ordnance Department and the Corps of Engineers, U. S. Army. The new design uses less than half the steel and less than two-thirds of the concrete required by an igloo magazine of equivalent storage capacity.

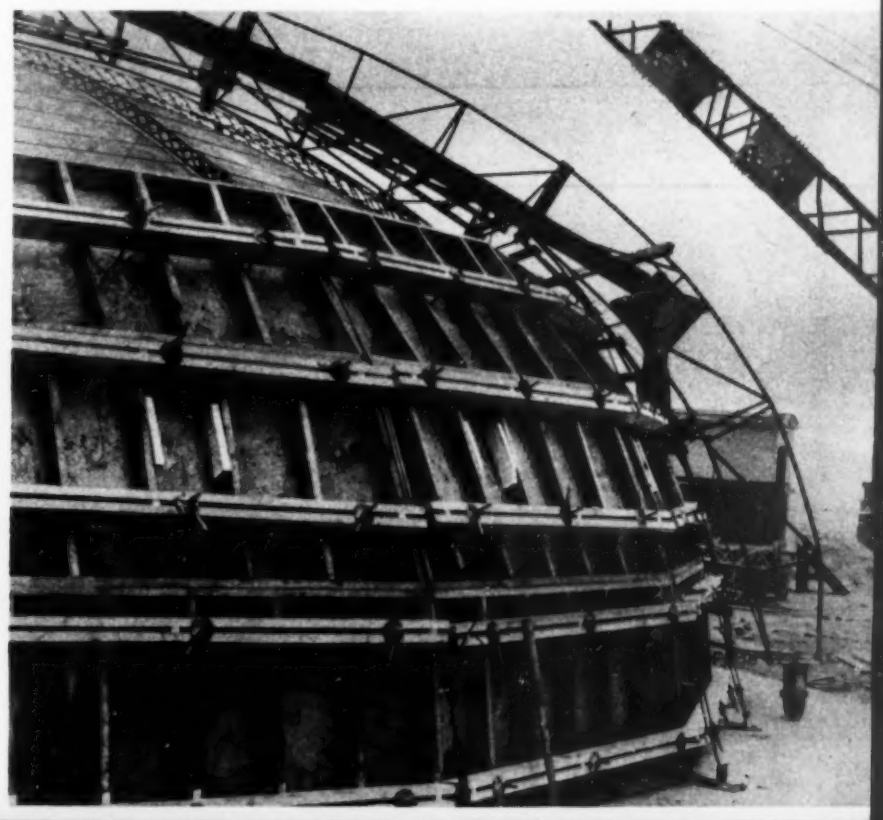
Construction economies which are possible in repetitive construction of the beehive units could be fully realized only if forms, erection methods and concreting practices were worked out in advance to save time and cut labor costs. The preliminary experiments developed functional equipment and working procedures which are now being applied on War Department projects to gain full benefit of construction savings.

Because of the closed shape of the thin beehive shell, which has a uniform thickness of only 6 in., design of forms for repeated use presented a difficult problem. To fulfill their function, the forms had to be foolproof and easy to erect and dismantle. No amount of paper calculations could achieve a form design which would meet these requirements. Only by trial and error in actual construction of a full-size beehive could all difficulties in the design and erection of the forms be corrected.

After several trials, the designers and erectors developed both steel and wood forms which fulfilled all requirements.

CHUTE ON TRAVELING CARRIAGE (below) delivers concrete to ports in exterior form. Service of power crane is required for few hours to handle buckets of concrete to central hopper at top of carriage.

SPREADER-TIES AND WALES (below) secure final type of wood panel forms against displacement as concrete is deposited in thin-shell dome.



COMPLETED CONCRETE BEEHIVE shows marks of form joints, form ties and doors for passing concrete through outer form

Steel forms were worked out in collaboration with J. L. Boettner, president of the United Concrete Form Products Co., Chicago, which supplied these forms. In the process of testing the forms, complete sets for a beehive of 44-ft. 7-in. diameter were erected at least five times. As a final step, concrete for a complete dome was poured in the wood forms, and the forms were stripped. Accompanying photographs indicate various stages of the experimental work and the final concreting operation.

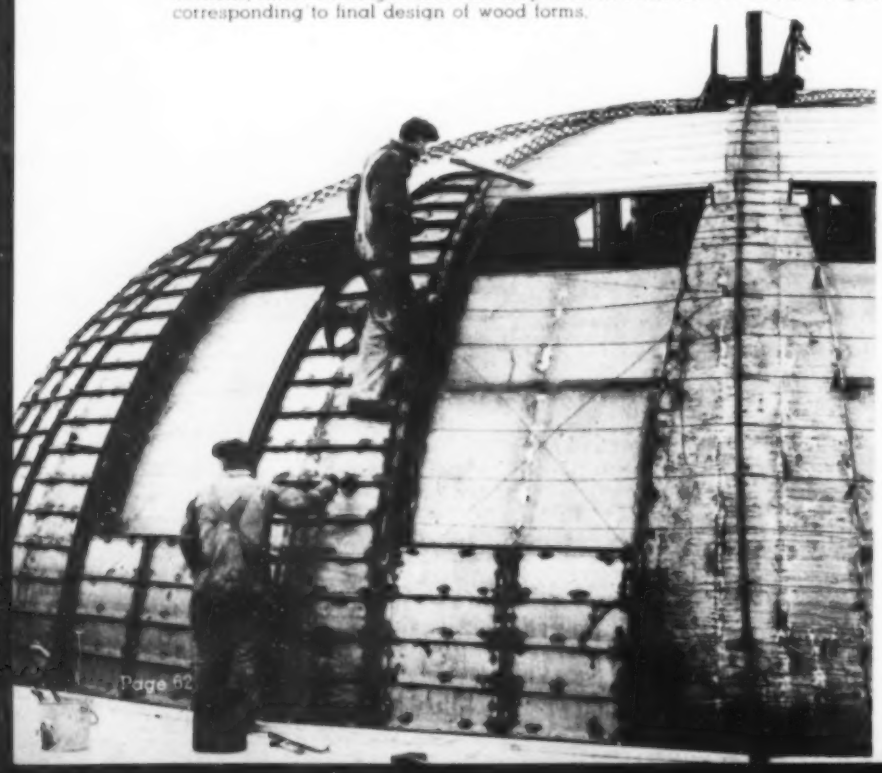
By the nature of the design of the beehive magazine, successful erection of the reinforcing steel and forms for the thin-shell dome depends upon proper construction of the foundation slab. Anchor bolts set in the concrete slab fix the locations of a central mast and of radial erector arms which support the steel reinforcing frame of the dome during erection. The concrete dome is not attached to the slab but rests freely on it.

Beehive Storage Magazine—To provide storage capacity equal to that of standard semi-cylindrical igloos 60 ft. and 80 ft. long, Corbetta beehive magazines are designed in two sizes with diameters of 44 ft. 7 in. and 52 ft. The principal features and dimensions of the smaller beehive are shown in an accompanying drawing. This is the magazine on which the preliminary experiments were made. It will be noted that the roof is a compound curve of two different radii and that the plan of the dome is a polygon of sixteen sides. For the larger 52-ft.-diam. beehive, the roof radius at the haunch remains 12 ft. 9 in. (equal to the arch radius in the standard igloo), but the top radius above the point of compound curvature is 39 ft. 3 in. This magazine is a twenty-sided polygon, and the height at the center is 16 ft. 2⅛ in.

(Continued on page 106)

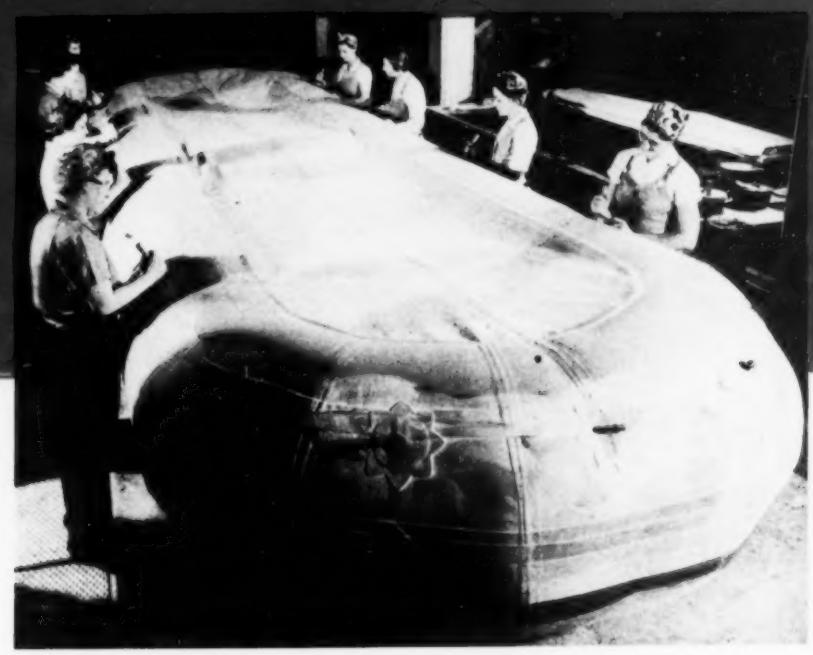
WELDED STEEL PANELS, made in sizes which can be handled readily by workmen, have flanges punched for joint clamps. Markings identify panels for erection.

EARLY TYPE (below) of steel form, with tall, tapered panels at chord intersections, later is changed to make all panels in each tier of uniform height, corresponding to final design of wood forms.



TWO WORKMEN set steel panel in exterior dome form. Design of tall corner panels, as shown at right in this view, later is modified to make all panels uniform in height.

JOB oddities



RUBBER PONTONS, OR FLOATS, for U. S. Army use in military bridge building or stream crossing operations are made of rubber and fabric at one of plants of B. F. Goodrich Co. With these units, inflated with compressed air, floating bridges are built to carry 28-ton tanks. View shows bottom of ponton with women workers rolling down chafing strip to reinforce parts of structure.

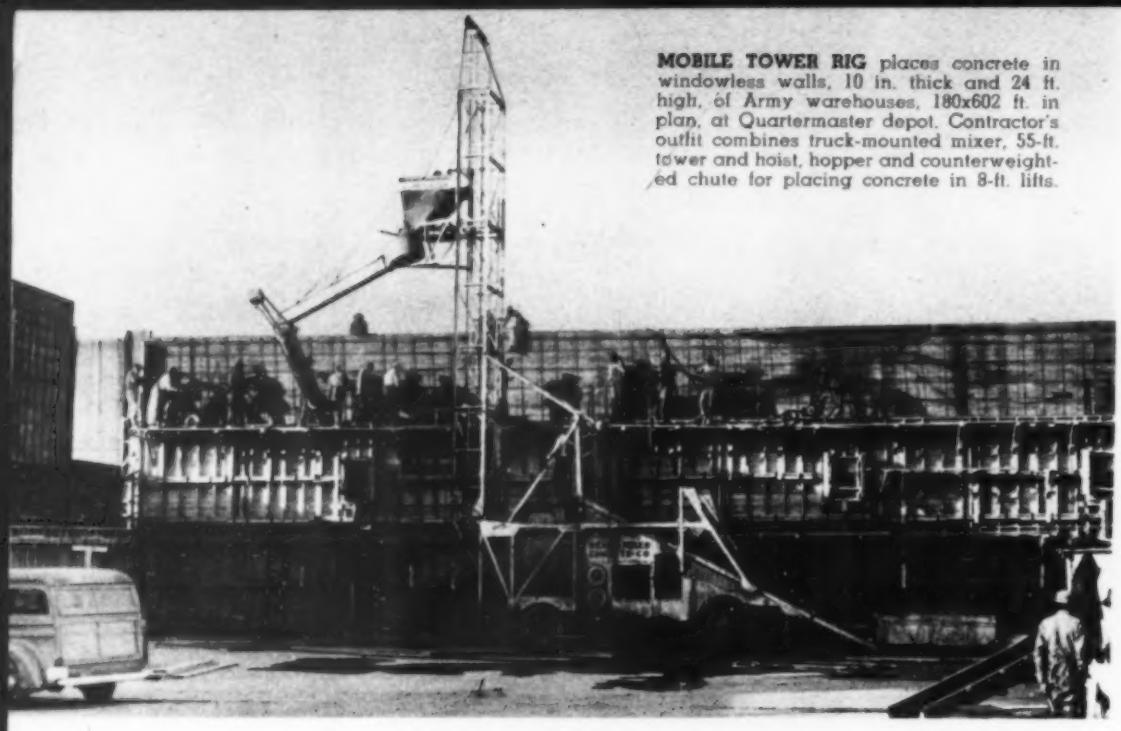
A PUSHOVER for this Caterpillar D-6 tractor equipped with LeTourneau angledozer is job of clearing land in Clearwater County, Minn. Owned by Christensen & Waggoner, of Bagley, Minn., outfit fells trees from 10 to 15 in. in diameter on large tract of cutover land awaiting plow.

HUGE ROCK CORE (right) of 5¼ tons in weight, measuring 3 ft. 8¾ in. in diameter, and 6 ft. long, is removed by Calyx core drill from bed of Fordham gneiss on Delaware River aqueduct project of New York City Board of Water Supply. Core was removed from drilled hole at depth of 224 ft.

British Combine Photo

PRIMITIVE METHODS OF EARTH MOVING are employed by Chinese workers, using pair of baskets on yoke to deposit fill for new Yunnan-Burma railway link.

SEABEES (below) is name derived from phonetic pronunciation of letters C B, designating Construction Battalion, adopted for U. S. Navy's new construction regiments. Encircled by hawser, official insignia for new units shows flying bee, fighting mad, clutching Tommy gun, wrench and carpenter's hammer. Navy's construction regiments are organized to supplement or replace contractors and civilian employees beyond continental limits of United States.



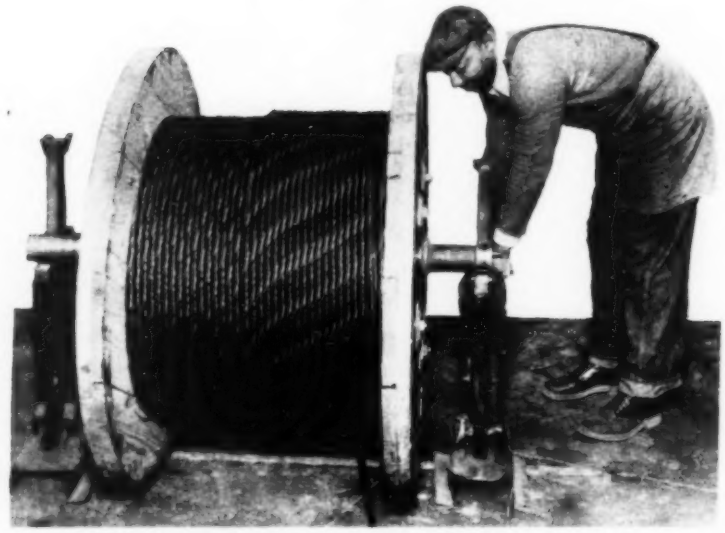
MOBILE TOWER RIG places concrete in windowless walls, 10 in. thick and 24 ft. high, of Army warehouses, 180x602 ft. in plan, at Quartermaster depot. Contractor's outfit combines truck-mounted mixer, 55-ft. tower and hoist, hopper and counterweighted chute for placing concrete in 8-ft. lifts.

Pat Dowling Photo

SAFETY TONGS for handling electric cable carrying current at 2,200 v. to power shovels are designed to prevent injury to workers in quarry of Southwestern Portland Cement Co., at Victorville, Calif. Handles of hardwood are made moisture proof by boiling in linseed oil and painting. Further to insure insulation against shock, tongs are handled by short lengths of rope passing through holes bored in handles of tongs.

HOW *They Did It*

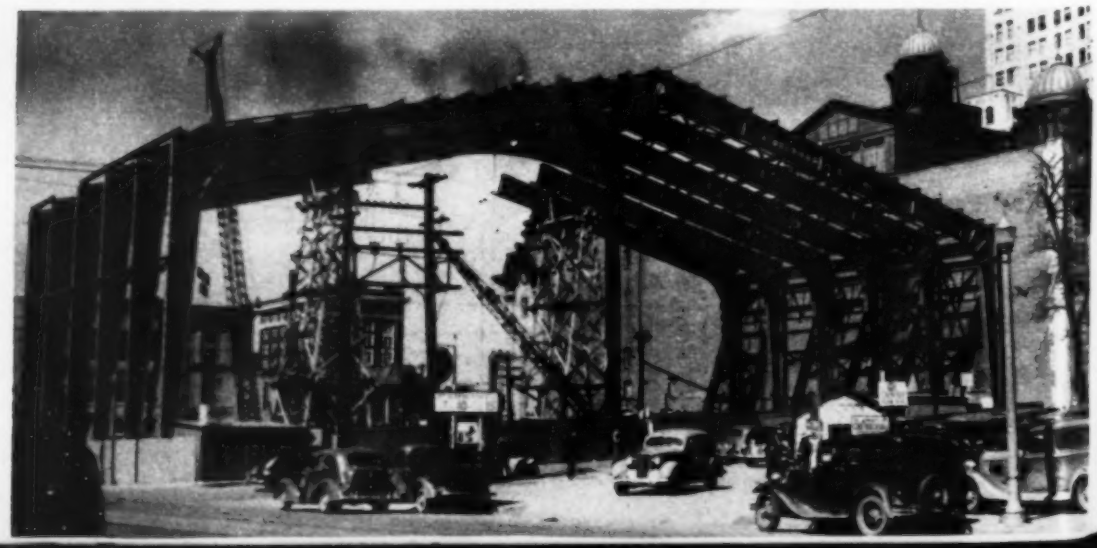
CONSTRUCTION DETAILS *For Superintendents and Foremen*



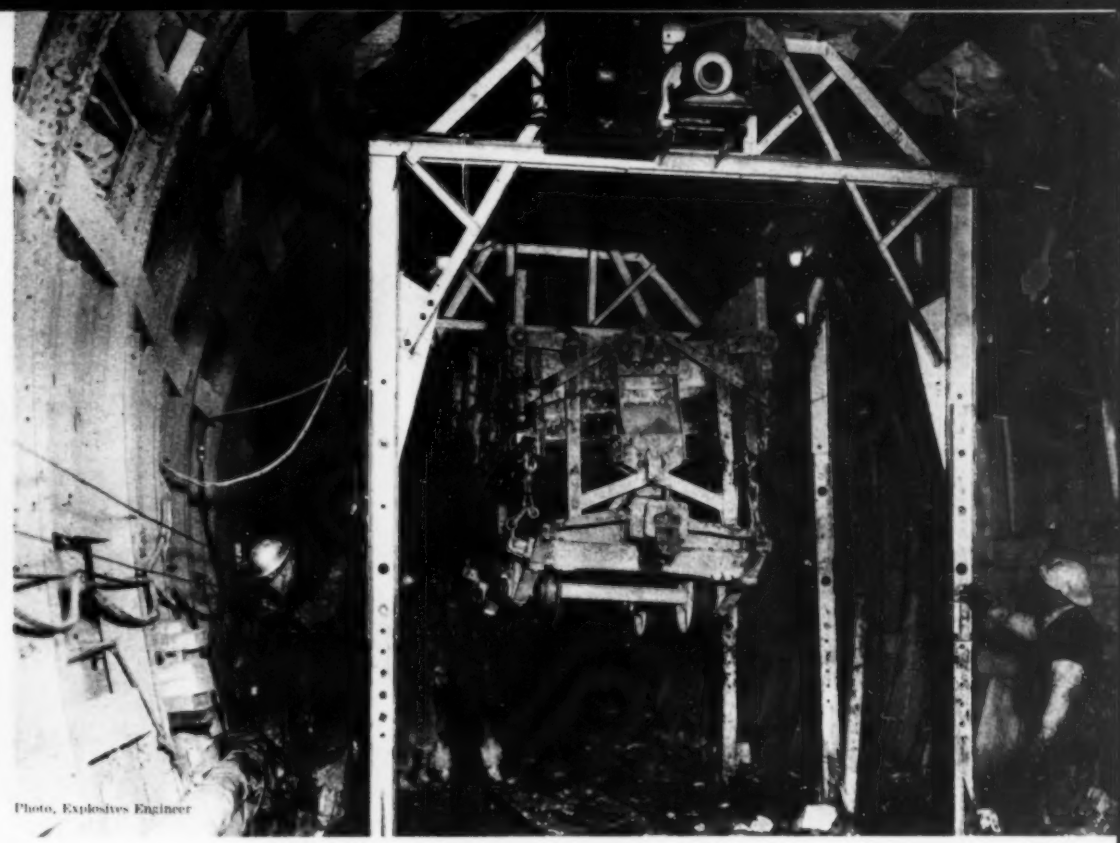
FOR SPOOLING WIRE ROPE, reel support, involving use of Simplex jack, proves effective at Dallas, Tex., branch warehouse of Harnischfeger Corp. To toe lift of jack a 1x1-in. steel bar is welded to carry 6-in. bracket extension which, in turn, supports two rollers on which 3-in. pipe spindle rests. Extension is welded to base of jack to prevent toppling over when pulling cable from reel. Spindle, with one end set fraction of inch higher than other, has flange that keeps reel centered when unspooling cable. Small flanges or collars on rollers prevent reel from drifting to lower side of spindle.

PULLING COUPLINGS AT JOINTS (below) of asbestos-cement pipe line to distribute to Torrance, Calif., water delivered by Colorado River Aqueduct of Metropolitan Water District of Southern California, is done with aid of hydraulic jack by crew of Warren Southwest, Inc., low bidder on 9,823-ft. contract. From collar on pipe already in place, chains extend to jack which forces section into place. Pipe used on line had diameters of 20 and 16 in. and was supplied by Johns-Manville Corp.

RIGID FRAME STEEL ARCHES of 214½-ft. span and 94-ft. rise, spaced 20⅓ ft. on centers, support roof of addition to municipal auditorium at Denver, Colo. Each arch has depth of 6 ft. 1⅞ in. and is made up of ½-in. thick web plate, flanges of two 8x6x¾-in. angles and 24x1 1/16-in. cover plate. Each arch is erected in five sections with aid of timber falsework and cranes. American Bridge Co., under subcontract, fabricated and erected arches for E. Burkhardt & Sons Co. of Denver.

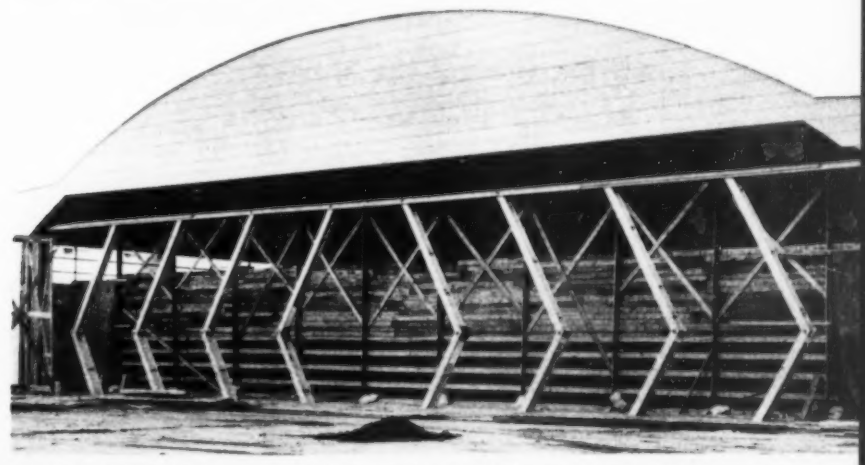


FOR CLEANING JOINTS prior to pointing up brickwork where no supply of compressed air is available, hand-operated football pump proves useful in removing dust and mortar chips which might impair bond of new mortar.—Photo from ANDREW VENA, New York.



Photo, Explosives Engineer

"CHERRY-PICKER", equipped with hoist on steel gantry frame, raises empty muck car for transfer to head of train for loading in diversion tunnel at Whitney Point Dam, U. S. Engineer flood control project in upper New York State. Contractors are Shofner, Gordon & Hinman and Hunkin-Conkey Construction Co.

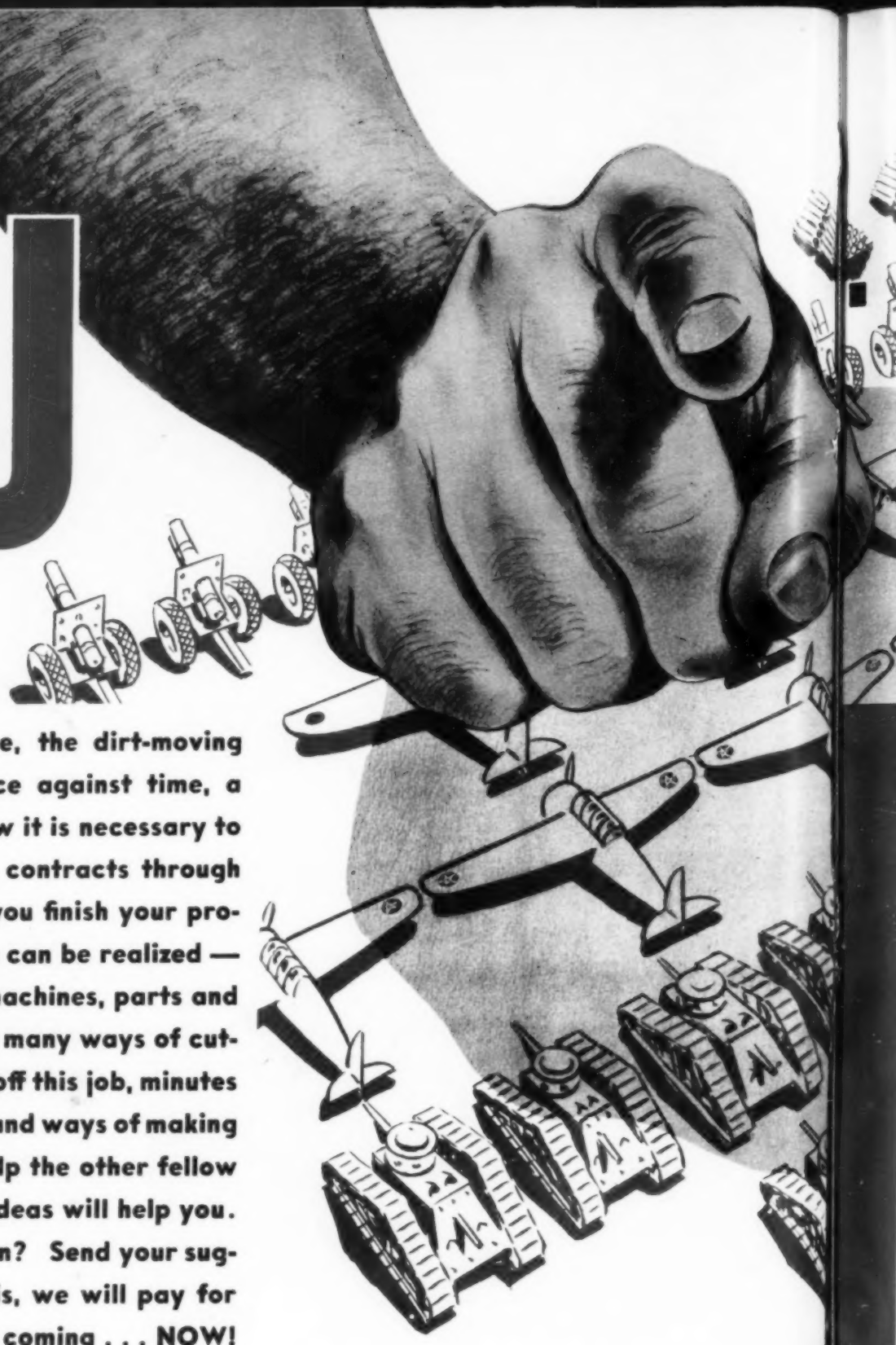


COLLAPSIBLE DOOR covering 100 ft. wide by 20½ ft. high opening of Army airport hangar at Garner Field, Tex., is designed by Younger Engineering Co., of San Antonio, to disappear by folding down into 20-in.-wide concrete trench 5½ ft. deep below floor level. On steel members, pin-connected at bottom of trench and provided with toggle joint at centers, 30-in.-wide sheets of No. 18 gage steel, forming leaves, are hung on rollers, overlapping each other like shingles on a house. As door is lowered into trench, lapped leaves slide over each other. Accompanying view shows only jointed framework of door, before sheet steel leaves had been attached to it.

GROUT HOLES ARE DRILLED (below) with this machine set up in inspection gallery inside base of Friant Dam, U. S. Bureau of Reclamation concrete structure in California. Drill puts down holes deep in bedrock below dam preparatory to final high-pressure grouting of foundation rock to seal seams against percolation of water under pressure.

TO STOP BOMB FRAGMENTS (below), hollow concrete blocks are laid up without mortar as protection to windows of dormitory basement used as raid shelter at Radcliffe College, Cambridge, Mass. What might happen if bomb struck close to barricades is not stated.

YOU

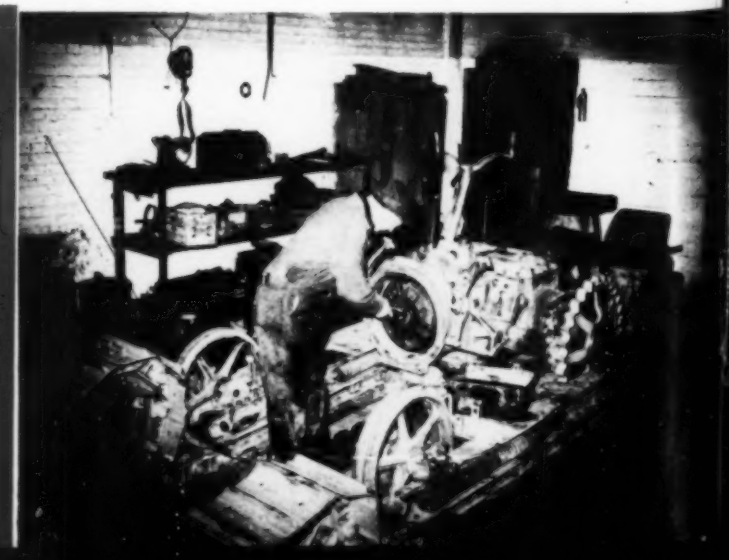


By its very nature, the dirt-moving business has always been a race against time, a battle against the elements. Now it is necessary to speed-up even more. Rush your contracts through ahead of schedule! The sooner you finish your project, the sooner its final objective can be realized — the more planes, ships, guns . . . machines, parts and supplies there will be! There are many ways of cutting corners . . . clipping seconds off this job, minutes off that one. Your job short cuts, and ways of making your machines last longer, will help the other fellow help his country . . . likewise, his ideas will help you. Why not exchange this information? Send your suggestions to us. To encourage this, we will pay for those used in our ads. Start 'em coming . . . NOW!

INVEST IN VICTORY..BUY WAR SAVINGS BONDS & STAMPS

KEEP 'EM ROLLING!

Keep your equipment in first-class condition. Your Allis-Chalmers dealer is fully equipped to give you A-1 service on repairs, parts, rebuilding jobs. He may have good buys on used machines, too. Keep in touch with him.



. . . can help build more War Supplies

PROVEN JOB SHORT CUTS

Use your reserve tractors as pushers. The pusher-loading method enables you to haul more material per trip, cut loading time ½ to ⅓ and reduce the wear and tear on your machines.

• • •

Load your scrapers downhill, wherever possible . . . it's quicker and much easier on your equipment.

• • •

Do your culvert pipe excavating with your 2-wheel scraper and 2-Cycle Diesel tractor . . . or with a Hough Shovel and WM tractor. Either machine will finish up the job in a fraction of usual time.

• • •

Handle your clearing with Allis-Chalmers tractors equipped with Carco winches. It's simple to run a winch line into an inaccessible area, attach the cable, and pull out the trees and stumps.

When finishing, windrow your loose rock with your Model AD Motor Grader or Leaning Frame Grader, then pick it up with your four-wheel Gar Wood scraper. Does a fast, clean job.

WIN $5

We Will Pay $5 for Each Suggestion Accepted for Publication in Future Advertisements . . . on

1. **Job Short Cuts (like examples you have just read).**
2. **How to Make Tractors and Graders Last Longer.**

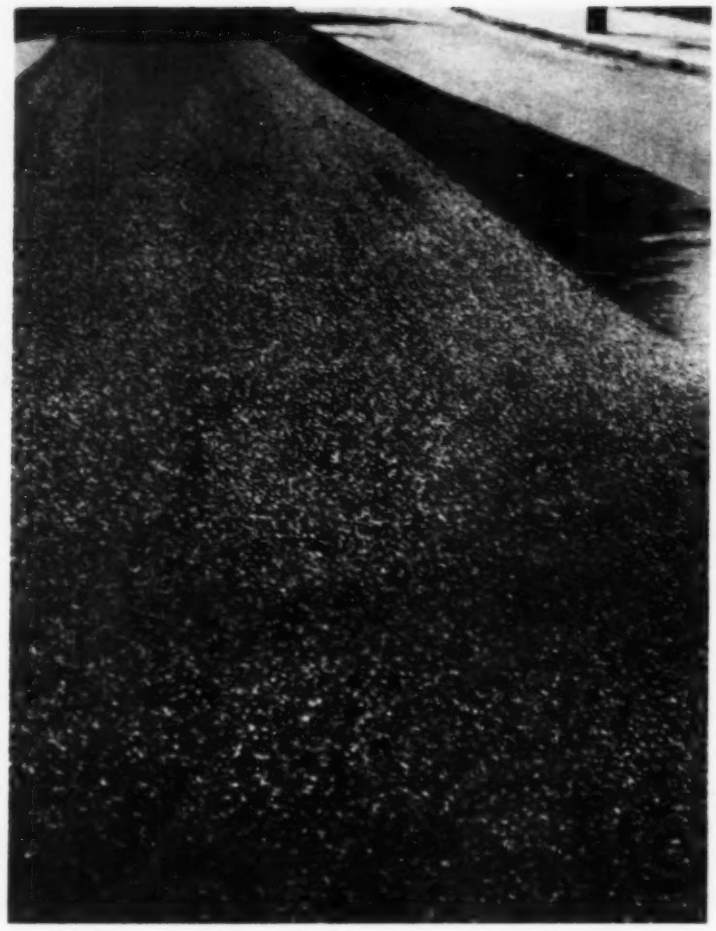
Use as many words as necessary to tell your story. Illustrate, if you wish. Awards will be based on the value of the suggestions, not on literary style. Everybody eligible.

ALLIS-CHALMERS
TRACTOR DIVISION MILWAUKEE U.S.A.

Power for Victory!

Maintenance of Bituminous Macadam Highways Requires Special Technique

TO FRESHLY APPLIED SEAL COAT on bituminous macadam asphalt surface pea stone of ½-in. size is applied by truck backing up.



TEXTURE of finished surface of bituminous macadam asphalt pavement after surface treatment.

AFTER SURFACE TREATMENT bituminous macadam asphalt pavement has this appearance.

By J. E. LAWRENCE
Maintenance Engineer,
Massachusetts Department of Public Works

A paper presented at the annual convention Feb. 25-27, in Philadelphia, of the Highway Officials of the North Atlantic States.

THE MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS has specialized for many years in the development of a bituminous macadam asphalt surface of a high type, but retaining advantages of low initial and maintenance costs. Specifications for construction are varied from time to time as new ideas are developed and as experience dictates, but the basic principle of a flexible pavement constructed of broken stone and bituminous materials incorporated together by penetration methods still holds.

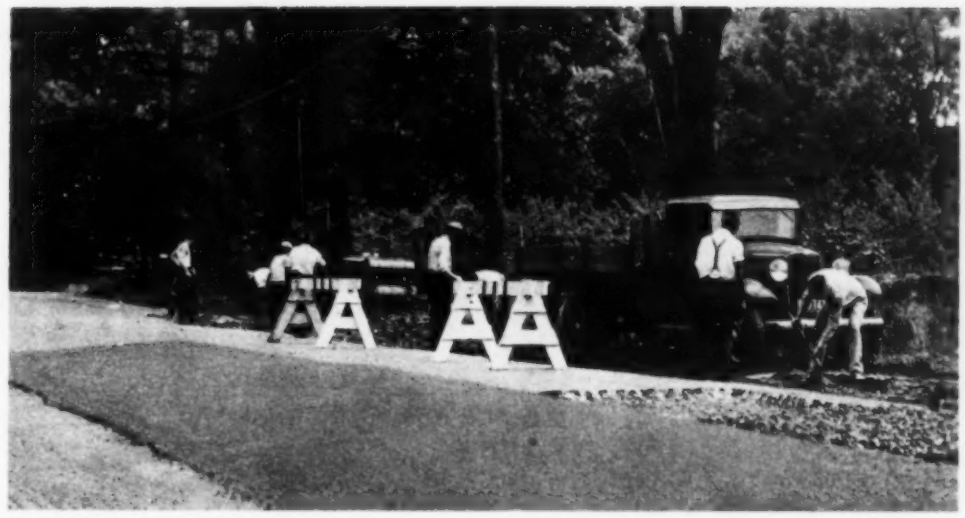
The first penetration work attempted by the Massachusetts Department of Public Works was in 1908 when an experimental section of road was built in Wenham using various grades of tar and asphalt products. Stone (1½ in.) was spread and rolled and the bituminous material heated in a large movable kettle from which it was spread over the stone by means of a hose and allowed to penetrate into the interstices between the stone. The road was then rolled and covered in different sections with top dressings of sand, gravel, or pea stone.

The development of the bituminous macadam asphalt pavement would not have been possible without the development of the pressure distributor, which permits uniform application and penetration of the bituminous material, and the use of heavier grades of bitumen. Such a distributor was used successfully in 1911 and 1912 for both new construction and surface treatments, and further refinements in construction methods and equipment in the next few years resulted in the production of the standard bituminous macadam pavement very much like the present pavement with its low initial and subsequent low maintenance costs. In view of the close relation and dependence of maintenance on proper construction, the following outline of latest construction methods of bituminous macadam asphalt pavements is set forth.

Stone Base and Top Course

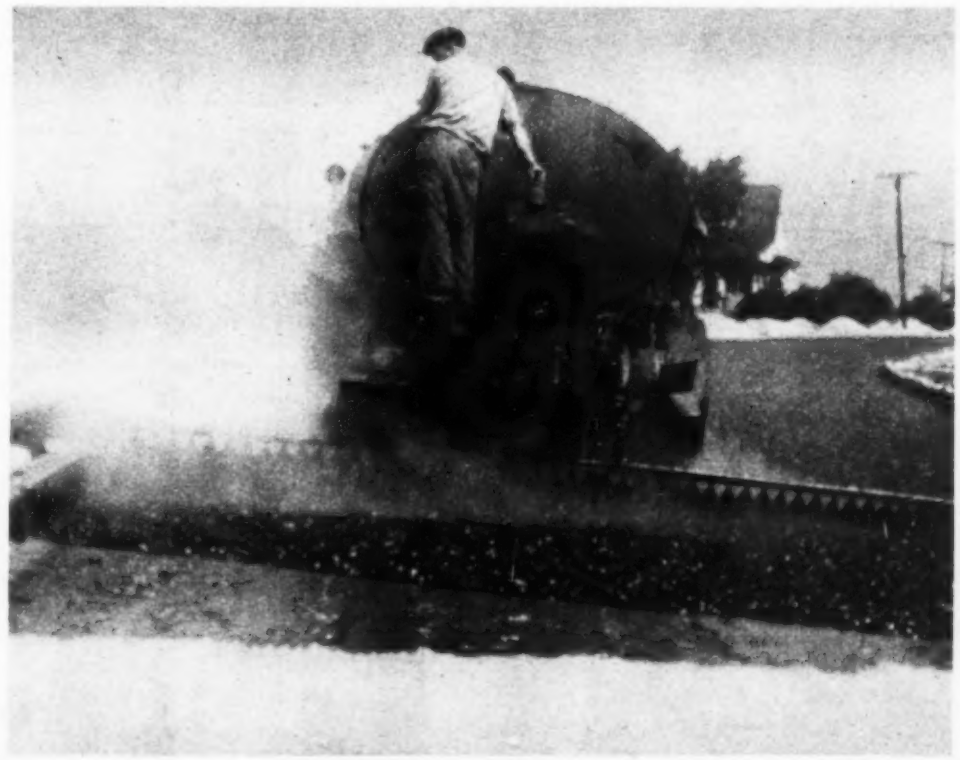
An adequate foundation, with the sub-soil properly drained and stabilized, must be provided in order to avoid frost heaves, boils or other distortion of the road surface. Where necessary 12 in. or more of the sub-soil is removed and replaced with clean, sandy, bank-run gravel placed in 6-in. layers and thor-

(Continued on page 115)



PATCHING of bituminous surface is done by crew of Massachusetts Department of Public Works.

CLOSELY SEALED TYPE of construction is now generally used instead of former open type which proved noisy under traffic.

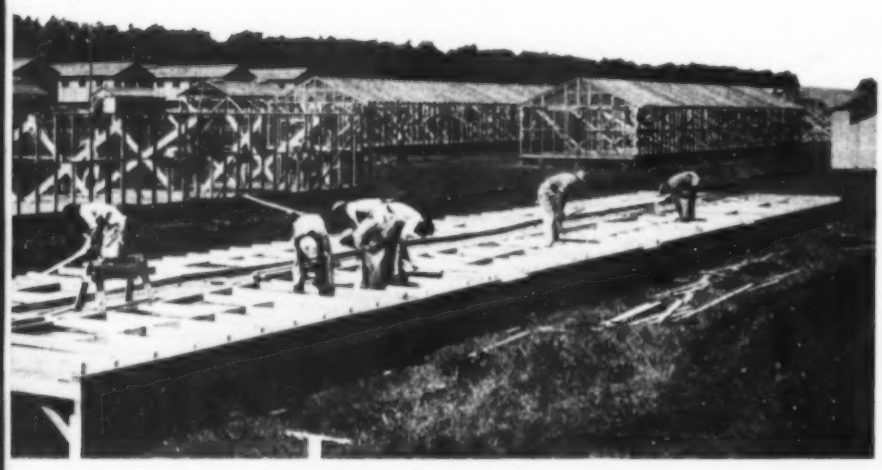


PRESSURE DISTRIBUTOR applies bituminous material to top course of stone, using spray bar covering width of 15 ft. and operated at pressure of from 40 to 60 lb. per sq. in.

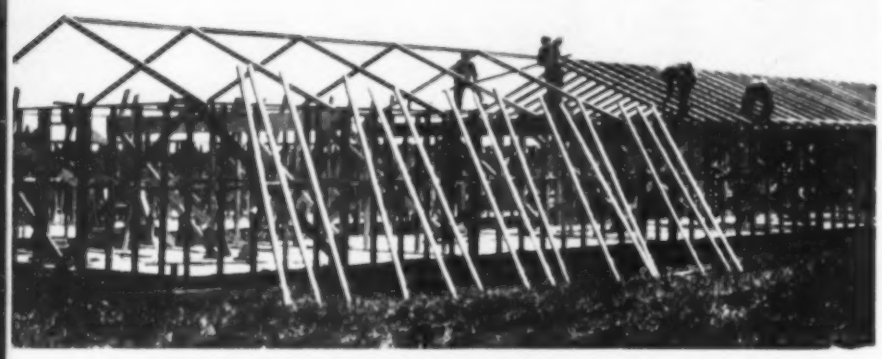
Plywood Cuts Time and Costs

IN ALIEN CENTER SHELTERS

AT ONE OF 3x3½-FT. WINDOWS is Robert McCarthy (left) contractor, who obtained Army permission to use plywood when he showed how it would be better and cheaper than original design. With him is Ted Johanns, his general superintendent.



TYPICAL OF FOUNDATIONS that added $125 per building to cost is this unit located on ground where water table is high. This floor area provides five 20x20-ft. family units.



1x4-IN. RIDGE BOARD is held in place by few rafters; others then are handed up over the plates to be nailed in place, and collar joists are spiked on.

BUILDING EXTERIORS (below) where plywood finish is used have neat appearance far superior to paper-and-batten covering. Note that footings here consist of 2x4-in. redwood laid on ground surface. This is less expensive type of footing.

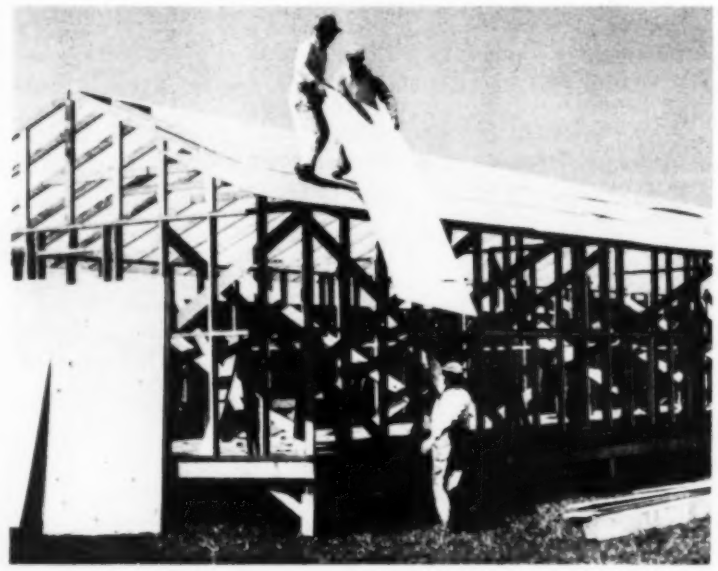
AFTER STUDDING for side and end walls has been nailed together on floor, walls are set upright as units, plumbed and braced in position.

RUSH JOBS ARE STANDARD these days, but how's this? At 10 a.m. Easter Sunday, contractors were advised by 'phone that the Army wanted bids on buildings for an alien reception center at Tanforan race track near San Francisco. The call was for 145 of the 20x100-ft. type structures for aliens; other buildings for the military personnel brought the total lumber requirement up to 2,000,000 ft. b.m. There wasn't much time to study plans and site because bids would be received and the contract would be awarded at 5 p.m., *same day!*

Award went to Robert McCarthy, California contractor who not only put in low bid, but convinced the authorities that he could give them a better job in less time and at lower cost if they would let him use plywood instead of the specified board-and-batten type walls. To be sure of his standing, McCarthy put in his bid of $1,730 per building if built as specified, and then offered to cut this $100 per building if the substitution of the plywood type was approved.

His alternate plywood design, instead of skimping on the building frames, actually made them stronger. Original specifications called for studs on 4-ft. spacing, but McCarthy's

(Continued on page 122)



PLYWOOD ¼-in. thick in 4x8-ft. panels is stacked up along sides of buildings so that carpenter squads can make high speed in nailing it on.

FOR OUTSTANDING ACHIEVEMENT in construction, The Moles, New York organization of tunnel and heavy construction men, has conferred awards on M. J. MADIGAN **(left)** member of firm of Madigan-Hyland, consulting engineers, and EDMUND A. PRENTIS **(below)** secretary and treasurer of Spencer, White & Prentis, Inc., engineers and contractors specializing in underpinning and foundation work.

ON BUSMAN'S HOLIDAY with PAUL L. MATCHETTE (left), Barber-Greene representative in Kansas City, Mo., DEAN DILLON, managing partner in contracting firm of D. H. Hardman, Alton, Kan., inspects continuous asphalt mixing plant equipped with volumetric proportioning unit set up by Tobin Quarries, Inc., Kansas City, for paving motor parks at Fort Leonard Wood.

AT SANTA FE DAM. U.S. Engineer Department project in California, A. H. JOHNSON **(left, top)** is general superintendent and R. F. RASEY **(left, bottom)** project manager for Morrison-Winston-Shea-Twaits construction organization which is building structure.

Pat Dowling Photos

Present and Accounted For

A PAGE OF PERSONALITIES

NEW DIVISION OFFICERS of Associated General Contractors of America, named at recent twenty-third annual convention in Indianapolis, Ind., are: Highway Contractors' Division, J. H. PITTMAN **(left)**, president, Gulf Bitulithic Co., Houston, Tex.; Heavy Construction and Railroad Contractors' Division, L. C. ROGERS, **(center)** president, Bates & Rogers Construction Corp., Chicago; Building Contractors' Division, WILLIAM MUIRHEAD **(right)** president, Wm. Muirhead Construction Co., Durham, N. C.

On-the-Job Maintenance

(Continued from page 57)

the tire may be slid over it will help inch the tire on the rim.

10. When tire beads are stiff and hard to slip on rims, a solution of soapy water is the best lubricant. It eases the work of mounting drop center types. Because of its usefulness, a soapy water solution should be kept at hand wherever possible.

11. After inserting a tube, put a little air in it. Then run your hand between the rounded-out tube and the casing to release any trapped air.

12. Unless proper precautions are taken, mounting and dismounting tires is dangerous business. When dismounting, be sure all air is out of the tire before the lock ring is loosened. When mounting, be sure complete rim is assembled correctly and lock ring is correctly seated before starting to inflate. As an added precaution when inflating stand to one side of the tire or use a clip-type chuck which does not require holding but clips on the valve and permits the operator to get out of the way. (Schrader 6529; Dill 6257).

13. When replacing one dual tire alongside a hot tire in which inflation has been built up from running, inflate the cold tire to match the pressure in the hot tire and later adjust the pressures evenly on next check, or after 3 hr. of running.

14. Do not "bleed" hot tires under any circumstances. (Letting the air out when pressure builds up called bleeding).

15. After mounting and tightening lugs on demountable rims, the wheel should be checked by spinning to detect wobble or eccentric mounting. All lugs should be tightened once a week.

16. Don't fill tires with water weighting which requires addition of calcium chloride anti-freeze without first checking with your tire supplier. Ordinary valves will not withstand calcium chloride, but valves capable of resisting calcium chloride attack are available.

Systematic Tire Servicing

As a first requirement of correct tire servicing, tires should be inflated to recommended pressures as given in the Tire & Rim Association tables. Copies of these tables are available from tire manufacturers. The following tables are appropriate for the equipment and services indicated: Table EM-1D, for drawn scrapers and other self-moving equipment traveling at speeds of 1 to 10 mph.; EM2C, for dump trucks, self-powered scrapers, and dirt wagons operating at 11 to 25 mph.; Standard Truck & Bus Tables TB2A and TB3A, for vehicles traveling at sustained speeds over long distances; RG-3A, for graders; and LP-1B and LP-3B for low-platform trailers.

Conventional highway tires, as well as

(Continued on page 76)

This is number 10 in a series of informative articles prepared by Macwhyte Wire Rope Company. The purpose of this series is to help wire rope users in these critical times to get the longest possible service from present ropes . . . through making useful facts on rope care more widely known.

CORROSION IN WIRE ROPE

Corrosion is one of wire rope's worst enemies. It strikes without warning. It often reaches an advanced stage before being noticed. And even though checked it still leaves its imprint of destruction.

We can better understand corrosion (and how to prevent it) by knowing what it is, what causes it, where and when it is likely to strike.

What Corrosion Is

The dictionary defines corrosion as "an action of eating or wearing away by slow degrees; a gradual decay by crumbling or surface disintegration; a gradual breaking down of the material attacked."

Two General Classes

There are two distinct types of corrosion:

Acid corrosion, and

Alkaline (or salt) corrosion.

In the case of acid corrosion the wires become pitted and stress concentrates at the reduced cross-sections where pits are located. This causes premature failure of the rope.

In the case of alkaline, or salt corrosion, the wires become encrusted with a layer of the products of corrosion. The rope becomes rust bound, for example. Alkaline corrosion increases the size and weight of the steel wires.

Acid and alkaline corrosion both may occur when ropes are operating in (or subjected to) ordinary atmosphere or weathering, or special conditions which subject the rope to either acid or alkaline substances.

What Happens When Corrosion Sets In?

When this occurs the rope loses its flexibility. Then some of the wires are overloaded, which causes them to break. This is the "beginning of the end" for the entire rope. It starts to wear away rapidly.

No Way To Determine Rope's Safety Once Corrosion Sets In

Corrosion, probably the most severe type of deterioration, is the most difficult to evaluate. Ordinarily when internal corrosion has taken place, external corrosion is also present. But it is impossible to accurately estimate by any known means the remaining strength or safety factor of the rope once corrosion has set in.

More Information

The next advertisement in this series prepared by the Macwhyte Wire Rope Company will discuss ways of preventing corrosion, or in those cases where corrosion has gotten a start how to check it from doing further damage.

Feel free to write us on this, or any problem you may have. We are ready at all times to do whatever we can to help you get the most from your wire rope.

* * *

VICTIMS OF CORROSION!

These ropes never had a chance to live a full and useful life. Left unprotected against the elements, they were attacked and needlessly destroyed by the ever present wire rope saboteur: corrosion.

A very good example of Alkaline Corrosion. Notice how outside wires are partially eaten away—a rope unfit and unsafe. Crown wires have broken up. The other side of the rope next to the sheave has few broken wires . . . but if flexed in the opposite direction they would also break.

This rope was exposed to acid fumes which caused the wires to become brittle. This reduced their fatigue resistance and resulted in the wires breaking while bending over sheaves.

HERE'S ONE FACT ABOUT OUR SUBS

PASSED

BY CENSOR

U. S. submarines use RPM DELO— a lubricating oil for Diesels unequaled in any other country in the world.

The enemy can take this down in his notebook. He can even sneak a camera shot of it. But it won't do him any good.

Because with all the blueprints and photographs in the world he can't copy the calm, hard-headed skill and heroism of the men in our Navy submarines. He can't duplicate the free spirit and unhampered initiative that invented the submarine—and is going to keep on inventing.

And we're proud to say, for our part, that with all the oil in Asia neither he nor anybody else has anything approaching RPM DELO. And this is another thing he cannot copy.

If, at crucial moments, his rings stick and parts freeze—and he has to put in for overhauls many times as often—it will give us great satisfaction to say: . . . *"So sorry!"*

U. S. Navy submarines use RPM DELO and we're here to say that Uncle Sam has first call—and will continue to have first call—on every precious drop he can use.

Standard Oil Company of California

ORDER RPM DELO FOR YOUR DIESELS

RPM DELO is marketed under the following names:

RPM DELO · Caltex RPM DELO · Kyso RPM DELO
Signal RPM DELO · Sohio RPM DELO
Imperial-RPM DELO
CONCENTRATE

Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity.

LET'S GO! U.S.A. KEEP 'EM FLYING!

RPM DELO
DIESEL ENGINE LUBRICATING OIL

(Continued from page 72)

off-the-road tires, should be inflated according to the proper off-the-road tables when used in off-the-road service. It is important not to over-inflate. Air should not be added because a scraper tire flexes; the tire is made to flex in such service.

Distinctions noted in the Tire & Rim Association tables definitely mean that a dump truck used exclusively on the job and not subject to sustained speeds in excess of 25 mph. comes under the EM2C classification in respect to tire pressures. If the truck is a licensed vehicle and highballs along the highway, it falls in the TB2A and TB3A class.

Specifications on correct tire inflation, set up in tables giving load and inflation data for various classes and sizes of tires, are no more difficult to use than the specifications operators regularly follow on oils and greases. All the tire specifications are available in convenient form from tire suppliers.

Certain basic rules are essential to the proper servicing of tires. The following rules are important:

1. Check tires every three shifts with an accurate gage such as Schrader 7188 or Dill 6197. Always have accurate gages on hand. Inaccurate gages usually will be found to vary in their readings. In other words, the error is not uniform from one reading to the next.
2. Add air when the level has dropped 5 lb. in normal manner (3 lb. on passenger tires).
3. Do not reinflate if excessive loss occurs — say 5 lb. or more in 24 hr. at uniform temperatures. A large drop means excessive loss of air from: (a) leaky valves, (b) puncture or (c) some other cause.
4. If a leaky valve is found, replace the valve core and put on a new valve cap, making sure that there is no leakage with the new core and cap.
5. If there is no leakage in the valve, the tire and tube should be dismounted for inspection and repair. *Don't continue to reinflate tires under suspicion.*
6. *Keep good caps on all valves.* This rule is absolutely vital on off-the-road operation. Don't use a permanent type cap which does not require removal for inflation. This cap is practical only on highway tires.
7. Always be sure to replace the valve cover on disk wheels.
8. Maintain uniform pressures in dual tires and uniform pressures in all tires across the axle.
9. Overinflation, or uneven dual inflations, will cause serious trouble. Tires on construction equipment are designed for low unit pressures for maximum flotation (ground contact area). Efficiency of the equipment is increased by following correct tire specifications.
10. When a scraper is being used in loose rock, voids in the load result in less weight than a solid load of earth. If scrapers are to continue for long in loose rock, it is advisable to reduce pressure 10 lb. to help resist cutting of the tires.
11. Where valves are fitted with exten-

(Continued on page 78)

(Continued from page 76)

sions, make sure that they are always accessible and that pressures can be checked accurately. Replace bad extentions immediately, and repair them later for reapplication.

12. Do not allow valves or extensions to touch the metal of the rim or wheel. A piece of woven conduit held by bicycle tape just short of the valve threads, or complete winding of bicycle (or friction) tape, will protect the assembly.

Maintenance and Repair

Repair and reconditioning of tires working under construction hazards are unavoidable and must be expected. To persist in operating tires until they blow is uneconomical and wasteful in dollars and cents as well as rubber.

From 10 to 15 percent of tire cost should be allowed for repairs of tires and tubes. Adherence to certain fundamental principles will help to hold costs within these limits. Here are some useful rules to apply:

1. Repair at once all deep injuries which penetrate to the cord body of the tire and allow dirt and water to enter.
2. Single *small* cuts, which do not gap or bulge open but leave only a hair-line opening, will cause no damage. When a cut shows any sign of gap or bulge, it should be repaired.
3. When a tire accumulates a number of small cuts, it should be removed and reconditioned at first opportunity, before the cuts begin to deteriorate from action of dirt and water.
4. Do not put a boot in a casing that is worth repairing. *The boot is to be used only to get a few days' additional service out of a tire not worth repairing.*
5. Knock out the rocks or pieces of wood which lodge between dual tires, as these objects will cause failures which seldom can be repaired.
6. Clean mud and dirt from around exposed valves periodically.
7. Keep oil off tires as much as possible. Oil causes very rapid deterioration.
8. Keep pusher blocks on scrapers in shape to help prevent dozer blades from gouging rear tires.
9. Caution skinners about allowing dozer blades to catch on tires.
10. Self-powered scrapers are made for pusher loading. Don't permit an operator to spin tires attempting to dig; let him drop the scraper pan and wait for the pusher to come up.
11. Accompanying illustrations show a method of replacing broken valves. If a damaged valve cannot be treated in this fashion, send the tube to a good repair man instructing him to close up the hole and insert and vulcanize a new valve stem at a different point.
12. Don't attempt to use cold patches on heavy tubes. Install tube plates, not valve patch plates, or send the tubes to a good repair man. A good repair man can put tubes with very large tears back in condition, provided the tubes are not too old. Don't throw away tubes having large tears

(Continued on page 80)

(Continued from page 78)

without first submitting them for repairs. There is no substitute for proper repairs to tires. Makeshift repairs are no more satisfactory or effective for a damaged tire than they are for a motor with a burned-out bearing.

Recognizing the increasing need for decentralized field depots to repair large tires, one manufacturer developed a new method of repairing large tires, including 18.00's, 21.00's and 24.00's, and two years ago started a program of new plants which now are well along to completion. By the new process, large tires are placed in a huge steam kettle, and repairs are vulcanized under high steam and air pressure. This method means that any number of practical repairs can be cured in one "heat", whereas under the conventional sectional-mold method used for small tires a separate cure (vulcanization) usually was required for each repair. Thus the process reduces the cost of multiple repairs and makes more feasible the reconditioning of large tires, i.e., sealing all small cuts, reinforcing large cuts both inside and out, and building new plies (section job) into tires which have repairable cuts and bruises.

Tires scored or cut at a number of places around the entire circumference, but still structurally sound, can be repaired in one cure. For smaller tires, such as truck tires, an operator usually will find nearby plants able to handle repairs.

Kettle points where large tires can be repaired: 24.00 and all smaller sizes — Los Angeles, Chicago, Dallas, Memphis, Akron; 21.00 and all smaller sizes — Minneapolis, Charlotte, Newark, Boston, Kansas City.

Receiving New Equipment

Occasionally on new equipment an operator experiences tire accidents for which no explanation can be found. Thorough inspection shows no fault in construction of the tire; no job conditions exist sufficient to produce such impacts as to rupture a casing with 300-lb. bursting strength as against 30-45-lb. internal pressure. Furthermore, no additional failures occur thereafter. The field man can reach only these conclusions:

1. Unloading may have been hurried or careless. Machines should never be dropped off a flat car or trailer in a manner that relies upon the tires to cushion the fall.
2. Some operators may have started out using large, soft tires for the first time on the new machines. The mere fact that a tire is large does not mean that it takes more air pressure than smaller truck tires. It actually takes less. The tire supervisor should take care that 10 to 20 lb. excess pressure is not added to a low-pressure tire through lack of knowledge, producing a failure.
3. For shipment, tires on new equipment are inflated to a specification 5 to 10 lb. over operating specifications. When the equipment is received, tires should be checked and pressures reduced to operating specifications.

All operators have found that mainte-

(Continued on page 82)

"GULF has helped us get ahead of contract schedule"

. . . says highway contractor

Keeley Construction Company, Clarksburg, West Virginia, associated with M. H. Cain, has a 1½-mile road construction job at Mannington, West Virginia. This project involves moving 225,000 cu. yds. of dirt and rock, and several large fills. Gulflube Motor Oil, Ringzone Motor Oil, Lubcote and other Gulf lubricants and fuels help this contractor make better progress.

"The efficient and dependable performance of our equipment with Gulf Lubricants and Fuels are important factors in our rapid progress."

"A LARGE share of the credit for our fast pace on this tough job is due to Gulf lubricants and fuels," says the contractor on this road construction project. "For with these Gulf products we get efficient, dependable performance from all our equipment, and extra hours of trouble-free operation."

Leading contractors on projects of every kind depend on Gulf quality lubricants and fuels to help them beat contract schedules. For they have learned from experience that proper lubrication and top-notch fuel performance result in more efficient operation of equipment, fewer delays from mechanical troubles, and less expense for maintenance and repairs.

You, too, will find it pays to use Gulf quality products on your next contract. They are quickly available to you through more than 1200 warehouses located in 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today. GULF OIL CORPORATION — GULF REFINING COMPANY, *Gulf Building, Pittsburgh, Pennsylvania.*

GULF

OIL IS AMMUNITION — — USE IT WISELY!

(Continued from page 80)

nance and patrol of roads (to throw off big boulders, fill holes and maintain a good hauling surface) pays dividends in increased production, as well as in savings on tires. Ground men around shovels in rock cuts are extremely valuable in tire conservation.

When starting work on ditches and in fields a preliminary search should be made for all objects detrimental to tire life.

Where scrapers are working in scarified or blasted material, it is important to avoid striking sharp stones with front tires, depending on the pan to protect the back tires. On hauls where a grader is not patrolling regularly, the pan of the scrapers should be dropped occasionally on the return trip to remove sharp stones and spillage with which the roads become littered. It is not too far-fetched to put a road patrolman on with pick, shovel and wheelbarrow. Many operators with tough hauling problems have done just that.

Night operations require more care and more road patrol by graders and bulldozers to prevent tire accidents. These precautions should be emphasized on night shifts.

Operating over solidly frozen ground is in the same category as operating in rock. Special precautions are necessary to maintain the haul roads in smooth condition and to keep lumps of frozen material out of the tire tracks. Wherever possible, equipment hauling over frozen ground should be tired with the heaviest ply available in the required size.

On-the-Job Service

In contrast to hauling operations over highways, where tire service is available at thousands of points, construction jobs must be self-sufficient in their ability to take care of tires. For servicing tires on off-the-road projects, several manufacturers of inflation and greasing equipment have brought out complete portable service stations for mounting on trucks or trailers.

These rolling service stations carry lubrication pumps for high-pressure lubrication, together with the proper oils and greases for crankcase service and gear lubrication. They also incorporate generating plants, floodlights and tanks for engine fuel and water. *To take care of tires, they are equipped with gas-engine-driven air compressors and air hoses for tire inflation.*

For rounding out the complete tire service for a construction job, the necessary parts and tools, including gages, chucks, valve tools, valve caps, valve cores and other parts, have been assembled into a compact Fleet Kit, illustrated by a photograph, which makes a single package of the whole range of small items required in the field servicing job. For the busy operator it is enough to know that a portable service station plus a valve fleet kit provides complete tire and valve service.

In addition to the specific items already mentioned, the kit contains repair valves, valve extensions, air-line connections and repair parts. A special feature of the kit

(Continued on page 84)

(Continued from page 82)

is a detachable airline ending which will take a quick-coupled clip-type chuck, an airgun or a standard inflating gun.

Rules to Remember

1. Keep a valve cap on each valve; as the valve will allow passage of air, only the cap can seal it 100 percent.
2. Make frequent inspections for cuts, snags and bruises. *A cut tire may finish the shift—but at the probable cost of complete failure of the casing.*
3. Put no boots in repairable tires; they are like sand in the motor.
4. Keep the tires away from the bulldozer blade; more tires have been ruined beyond repair from careless handling of the blade than from almost any other single cause.
5. Don't let the operator spin the tires. Spinning can easily cost a dollar per revolution if the tire is turning in abrasive material.
6. Give the tire responsibility to a man who has the "know-how". A greenhorn wouldn't be allowed to overhaul a motor. Don't let him service tires either.
7. When moving on to a new job, set up a compressor and begin systematic servicing at once. Operating for two or three weeks without service will frequently be reflected in poor tire performance for months thereafter.

★ ★ ★

Steel Saved By Using Wire on Housing Project

(Continued from page 49)

usually seven at a time, by a strongback with chains to hooks through the projecting loops of stirrups.

Floor Form Erection—After joists are set in place on 3-ft. centers, 2x3-in. wood purlins with metal-shod tips are rested, 30 in. apart, on ½-in. ledges provided for this purpose in the sides of the joists. Then 1x6-in. boards, three to the panel, are laid on the purlins, parallel to the joists, as a base for the plywood panels that serve as bottom forms for the concrete floor.

Each plywood panel is about 10 in. narrower than the space between the joists, thus allowing a 5-in. margin on either side where the beveled edge of the plywood increases the thickness of the concrete floor slab along both sides of the joist. This thickened slab is made with great economy of form lumber by tacking the plywood panels lightly to the two outer 1x6's that rest on the purlins. (Center 1x6 is not nailed.)

Shores are occasionally set at midspan beneath the precast joists when construction operations impose an exceptional load, as when concrete buckets are landed on the second floor. The dead weight of the

(Continued on page 86)

(Continued from page 84)

standard 3x8-in. joist in the 14-ft. length is 23 lb. per ft., or 322 lb. per joist. Thus far, precast joists of two types have been used, one having cross-section dimensions of 3x7¾ in. and the other 3½x8¾ in. Wire sizes required range from No. 0 to No. 6; the number of bundle wires (longitudinal reinforcing) that hang in the carriers near the bottom of the joists, varies from 6 to 10.

Forming Utility Openings

With panel forms of this sort, it is possible to cast floor slabs that will contain ready-made utility openings, exactly spaced. This is done by glueing and bolting to the plywood forms blocks of white pine carefully located in exact position and slightly tapered to facilitate removal after the concrete has set. The wire mesh spread on the forms for reinforcing the floor is cut and fitted around these projections, and as the same form is used repeatedly (ordinarily about 10 times) exactly duplicate spacings for utility openings are assured.

In addition to the precast joists, door and window sills, stairs and other units are similarly precast.

The Del Rio project, nearing completion as this was written, has been built according to plans laid out by Southeast Housing Architects, Associated, Los Angeles, Revision of floor and roof system designs to adapt them to the precast concrete system was suggested by the Wailes-Bageman Co., and the revised engineering plans were prepared by H. C. Whittlesey, structural engineer. Prefabrication and installation of the all-precast units as well as placement of concrete forms and wire mesh is under contract to the Wailes-Bageman Co., which also holds contracts for supplying the prefabricated concrete for the other housing projects. R. E. Campbell is the general contractor on the Del Rio project. The two other projects on which this type of construction is being employed are William Mead Homes (450 family units) and Aliso Village (802 family units).

★ ★ ★

Relocated Railroad

Carries First Train Around Shasta Reservoir

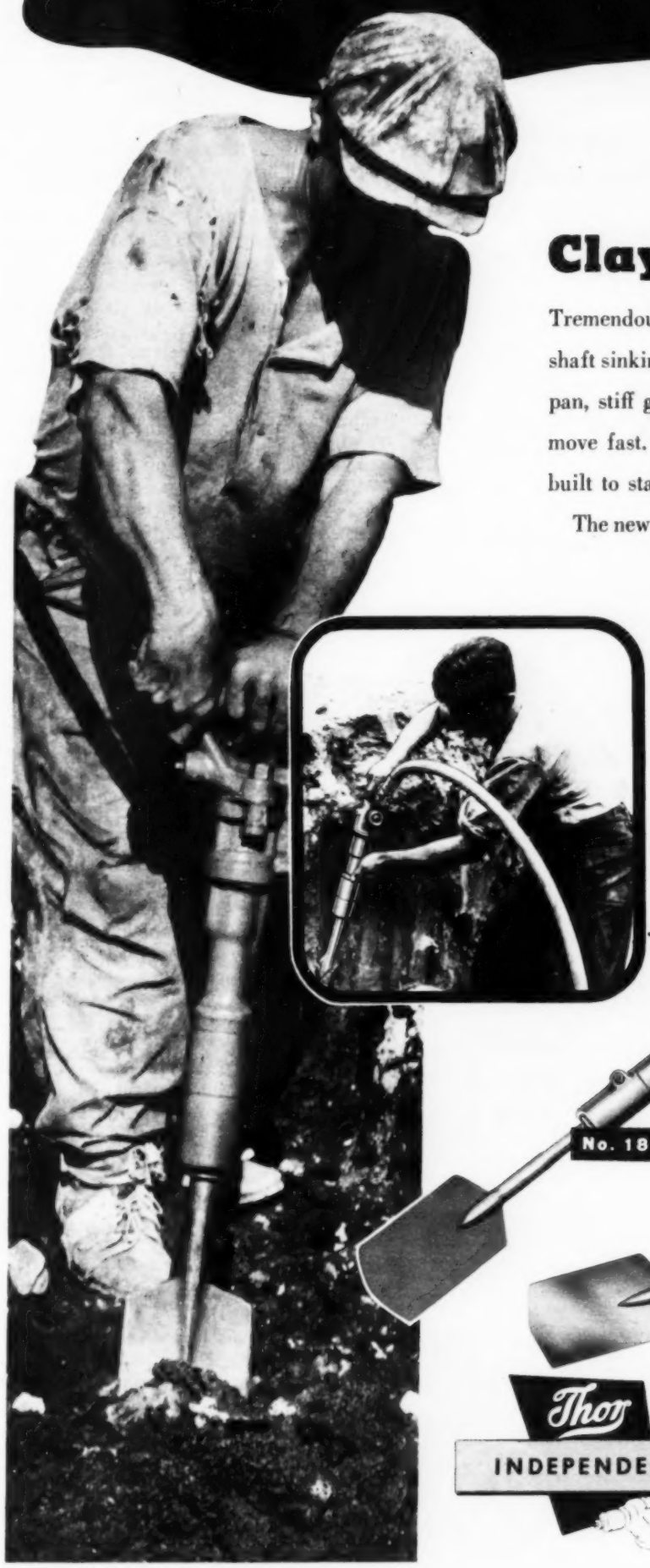
(Continued from page 46)

cated railroad marks a significant milestone of progress toward harnessing the Sacramento River and its northern tributaries for service to the great Central Valley. Shasta Dam, being built 12 mi. north of Redding, will aid river naviga-

(Continued on page 88)

Dig Hard Pan and Stiff Ground Fast!

Thor



Clay and Trench Diggers

Tremendously increasing the speed and ease with which trench digging, shaft sinking, and overhead and sidewall tunnel work can be done in hard pan, stiff ground and gravel, Thor Clay and Trench Diggers make jobs move fast. They are powerful tools, streamlined for easy handling and built to stand hard use and continuous service.

The new Thor Pig-Tail Rubber Bumper that fits around the shank of the digger spade as well as inside the retainer body absorbs vibration and keeps out dirt and grit. The Thor Cylindrical Rocker Valve puts every ounce of air to work. The Thor Self Sealing Throttle Valve insures positive power control and prevents air leakage.

Models for light, medium and heavy duty are available with closed handle or extended "T" handle. For full information write for Thor catalog No. 42.

6 Sturdy Tools

No. 18

Clay Digger

Thor Clay Diggers with closed handle and inside trigger are available in three models for light, medium and heavy duty.

No. 19

Trench Digger

Three Models of Thor Trench Diggers for light, medium and heavy duty service are equipped with extended "T" handle.

Thor *Portable Pneumatic and Electric Tools*

INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. JACKSON BOULEVARD, CHICAGO, ILL.

Branches in Principal Cities

(Continued from page 86)

tion, provide increased flood protection, conserve water for irrigation as well as domestic and industrial use, and generate electric power for war production.

Railroad Relocation

Construction of the giant dam, to be the second largest concrete barrier in the world, required relocating the railroad between Redding and Delta Station. Built in 1884 to connect California by rail with the Pacific Northwest, the old line winds up the Sacramento River Canyon past the damsite and through the reservoir area. The new highline railroad eliminates 7 mi. in distance and 5,000 deg. of curvature (equal to 14 complete circles) in comparison to the canyon line, and is expected to save 45 min. in passenger train running time.

Chief Engineer W. H. Kirkbride of the Southern Pacific said all passenger trains and southbound freight trains will be diverted over the new route immediately. Northbound freights, climbing into the mountains, will continue to use the old line until the water and fuel supply systems are completed for the new railroad. Skirting the shore line of the future 35-mi. lake in the rugged Siskiyou Mountains, the relocation includes 12 tunnels and 8 major bridges. Three of the tunnels are about a half-mile long. Two of the bridges exceed a half-mile in length.

Pit River Bridge

The huge Pit River Bridge, 15 mi. out of Redding, carries two railroad tracks on its lower dock and a four-lane section of U. S. Highway 99 on its upper deck, which is 500 ft. above the present river level. Construction of the towering concrete piers by the Union Paving Co,, of San Francisco, was started in November 1939, and the first steel for the superstructure was placed in December 1940 under a contract with the American Bridge Co. It has an overall length of 3,588 ft. including short highway approach viaducts on either side of the canyon. The relocated highway leading to the bridge is expected to be opened to traffic later this year, according to Mr. Lowry.

The entire railroad relocation has involved more than 4,000,000 cu. yd. of excavation to grade the roadbed, driving 19,000 lin. ft. of tunnels, erecting 29,000 tons of bridge steel, and laying 6,000 tons of rails.

While Shasta Dam and the railroad relocation have been under construction for the last 3½ years, train traffic on the old line has been carried past the damsite through a diversion tunnel which was bored under the west abutment of the damsite. The Sacramento River, meantime, has continued to flow unimpeded past the dam in its natural channel or in temporary diversion channels. Mr. Lowry said that after the canyon railroad above the dam is abandoned this summer, concrete will be raised in the mid-section of Shasta Dam and the river will be diverted through the tunnel now occupied by the railroad tracks.

3 ways TO GET THE MOST out of Tires

WHEN you make your tires deliver every bit of service built into them at the factory, you not only conserve rubber for Uncle Sam's war needs . . . you save yourself real money!

Stretching the life of your tires is simple, if you follow these practical suggestions . . .

1 Select the right tires for your job. It isn't enough to get the right *size* tires for the wheels of your equipment. The tires you buy should be of the right *type* — designed to deliver the best performance and longest wear on *your particular job.*

Your B. F. Goodrich dealer can always fit the tires to your job — because the B. F. Goodrich line of Silvertowns includes a special tire for every type of service.

2 Treat your tires with care. Whether or not your tires will give you all the service built into them, depends largely on the care and maintenance they receive. Your B. F. Goodrich dealer or B. F. Goodrich engineer can offer you expert help in this matter. Their suggestions will cost you nothing — they may save you plenty!

3 Retread your worn tires to meet new requirements. When you move to a new job where tires must meet different operating conditions, have worn tires retreaded with the tread design best suited for that job. Your B. F. Goodrich dealer can put on the right tread — save you the cost of new tires.

B. F. Goodrich hose, belting, accessories, and rubber footwear are value leaders, too . . . proved in use on construction jobs everywhere. To avoid inconvenience, to insure satisfaction . . . make B. F. Goodrich the one source of supply for all your rubber products requirements.

Free TIRE GUIDE!

Describes each off-the-highway tire in detail, tells the type of service it's designed for, and the type of equipment it's to be used on. Gives tips on tire care and maintenance that will help you conserve rubber and save money. For your *free* copy write Dept. T-59, The B. F. Goodrich Co., Akron, O., *today!*

B.F. Goodrich

FIRST IN RUBBER

Permanent Traffic Stripes and Rubber-Sealed Joints

(Continued from page 45)

against marring by burlap cover placed over the slab immediately, the traveling burlap bridge was equipped with a roll of 10-in. butcher's paper which unrolled on to the center of the pavement as the bridge was moved forward. A flexible piece of metal about 3 in. wide, extending out from the rear of the bridge, deflected the paper downward on to the traffic stripe and kept the paper from blowing away until the burlap could be placed.

Premolded bituminous fiber filler for ¾-in. expansion joints on 120-ft. centers was set 1½ in. below the surface and 1½ in. inside each edge of the pavement to leave space for all-around sealing with hot-poured rubber compound. For transverse contraction joints spaced 40 ft., c. to c., between expansion joints, the contractor elected an option permitting use of cut joints completely filled with sealing compound in preference to an alternate calling for premolded filler set 1 in. low and sealed on top with hot-poured material. Cut joints were a minimum of 2⅓ in. deep (one-third the depth of the pavement) and were ⅜ in. wide at the top. Load transmission assemblies made up on the job of dowel rods and steel chairs were installed in the slab at both expansion and contraction joints.

In addition to the transverse joints, each 22-ft. width of pavement included a longitudinal center-line joint filled with premolded ribbon-type material. The top of this filler was set just below the surface of the concrete, and tiebars 4 ft. long were placed in the slab below the joint material to tie the two 11-ft. lanes together.

Pavement design for this job called for reinforcement of the slab, and 44-lb. welded wire mesh was placed in each 11-ft. lane 2 in. below the surface. The reinforcement stopped 3 in. short of pavement edges and 2 in. short of the joints, both longitudinal and transverse.

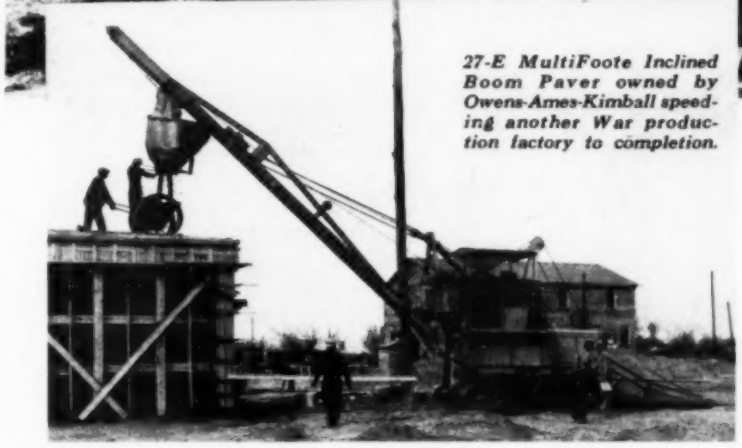
For joint sealing, the contract specifications required a compound of hot-poured type consisting of a mixture of materials which would form a rubbery, resilient and adhesive seal. It was specified that the compound should melt to the proper consistency for pouring at a temperature not exceeding 450 deg. F. and should solidify on cooling to atmospheric temperature.

Rai-Seal rubber compound used by the contractor to seal the joints came to the job in solid cakes inclosed in paper bags; the cakes were of a convenient size and

(Continued on page 92)

The answer to a 10 year Prayer!

Says . . . **R. D. OWENS**
of Owens-Ames-Kimball
Grand Rapids, Michigan
About his MultiFoote Inclined Boom Paver!



27-E MultiFoote Inclined Boom Paver owned by Owens-Ames-Kimball speeding another War production factory to completion.

MULTIFOOTE Inclined Boom Pavers are the answer to many a contractor's prayers. Right when most needed, when factories, roads and runways must go up almost overnight, these machines have come into the picture to speed up construction wherever concrete is mixed. They're fast, portable and flexible. You can pour footings, foundations, floors and walls, then move over and pave a road or a runway. Chase them all over a 100 acre lot and back again to mix and pour where you want, when you want *and in a hurry*.

To save time, beat schedules and help to win the War, plan now to put MultiFoote Inclined Boom Pavers to work on your job. Write for details or see your Foote dealer.

THE FOOTE COMPANY, INC., Nunda, New York

27-E and 34-E Single Drum Models!

- *Boom Tilts up to 45 Degrees!*
- *Bucket Hangs Vertically At Any Angle of Boom!*
- *35 Foot Boom!*
- *Standard or Special Buckets!*
- *Boom Swings in 160 Degree Radius!*
- *Easy to Operate!*
- *Fast Bucket Travel!*
- *Rugged, Stable, Trouble-Free!*

•

Plus all the proved MultiFoote features:

Double cone drum for thorough mixing; No Pressure Water System; Fast skip action; Quarter turn discharge; High operating platform and many other features!

Write for complete facts now.

MULTIFOOTE
Concrete Pavers

(Continued from page 90)

weight for handling by one man. The solid compound as delivered contained all the ingredients for joint sealing and required the introduction of no admixture on the job. To prevent adherence to the paper, the solid rubber compound in the bags was covered with a harmless white powder.

Accompanying photographs supplied by Keith C. Cawood, project engineer, indicated the equipment and methods employed in sealing the joints. To clean the joints for sealing and to melt the rubber compound, the contractor used a portable Chicago Pneumatic compressor and an Aeroil heating kettle hooked together for towing by a truck. The compressor supplied air to a pipe jet which removed all loose dirt from the joints; caked mud when present was dislodged with hand tools to facilitate the cleaning. As the air was hot, it dried any moisture in the joints.

After the paper had been stripped away from a cake of solid rubber compound, the material was cut into small blocks with heated spades to hasten melting in the kettle. The detachable burner of the kettle proved useful for heating the spades. In the kettle, the temperature of the molten rubber compound was held in a range from 400 to 450 deg. F., averaging about 425 deg. and never exceeding 450 deg. While the material was being melted for pouring, the heating tubes in the kettle were kept immersed in the molten mass at all times.

When drawn off into the pouring pots, the molten rubber compound was of about the consistency of thick mush. Sprinkling cans of the ordinary garden variety, with sprinkler heads removed, were used for pouring. The material poured easily, without splashing or spattering. Several trips along a joint were necessary to fill it flush with the surface.

To close the ends of the joints while they were being filled with hot-poured compound, the contractor's crew used metal plates backed up with earth firmly pressed in place. These metal dams made it possible to fill the 1½-in. vertical slots at the ends of the expansion joints and prevented loss of material from any joints. On the morning following the pouring of joints, when the sealing compound had cooled, the end dams were removed by a sharp blow with a pick handle on each plate. This blow knocked the plate loose without pulling the material.

Pavement Construction

Concrete was mixed by the Ransome 27E dual-drum paver in 29.7-cu.ft. batches containing 6.6 sacks of cement, equivalent to 6 sacks per cu. yd. Specifications required a 60-sec. mix, and the time locks on the two batchmeters were set to provide 32 sec. in the first drum and 28 sec. in the second. The concrete mixture incorporated two separated sizes of coarse aggregate, the larger size being crushed rock graded from ½ in. to 2 in. and the smaller crushed gravel from No. 8 to 1 in. Concrete slump ranged from 1½ in. to 3 in. (the maximum permitted by the specifications) and averaged about 2½ in.

Steel forms for the concrete pavement

(Continued on page 94)

"Without an overhaul job since October, 1938."

—from letter dated January 19, 1942

WHEN SHANNAHAN BROTHERS, Railroad and General Contractors, say that a shovel "has been subjected to extremely difficult work," it means something.

Yet this one has been used in their Quarry at West Riverside, California, since October 1938 "without an overhaul job of any nature."

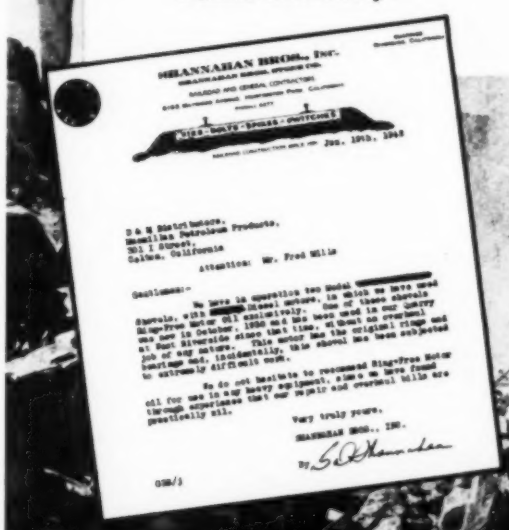
Shannahan shovels use Macmillian RING-FREE exclusively!

The motor shown "has the original rings and bearings," they write us.

And read why they say they do not hesitate to recommend RING-FREE "for use in any heavy equipment." It's because:

"We have found through experience that our repair and overhaul bills are practically nil."

What RING-FREE has done for others, it can do for you. Write us!



SHANNAHAN BROS., Inc.

D & H Distributors,
Macmillan Petroleum Products,
901 I Street,
Salem, California

Attention: Mr. Fred Mills

Gentlemen:-

We have in operation two Model [redacted] Diesel motors, in which we have used Ring-Free Motor Oil exclusively. One of these shovels is our [redacted] and has been in operation since that time, without an overhaul job of any nature. This motor has the original rings and bearings and, incidentally, this shovel has been subjected to extremely difficult work.

So do not hesitate to recommend Ring-Free Motor Oil for use in any heavy equipment, since we have found through experience that our repair and overhaul bills are practically nil.

Very truly yours,

SHANNAHAN BROS., INC.

By S. D. Shannahan

SDS/j

MACMILLAN PETROLEUM CORPORATION
50 W. 50th Street, New York • 624 South Michigan Avenue, Chicago
530 West 6th Street, Los Angeles

(Continued from page 92)

were set at least 500 ft. ahead of the mixer and were tamped in place by a Jaeger form tamper. A Caterpillar motor patrol, an RB finegrader and a Fordson roller prepared the subgrade for paving.

Traveling outside the forms, the paver distributed concrete across the 22-ft. width of subgrade with the aid of its 35-ft. boom. To spread the first course of concrete 2 in. below finished grade for the mesh reinforcement, an I-beam strikeoff riding on the forms was pulled forward by a hauling cable reeved through a pulley block on an outrigger arm to a winch on the paver. After the paver had placed the top layer of concrete over the mesh, a Jaeger tandem-screed finishing machine struck off and finished the surface of the pavement. A Flex-Plane joint machine cut the centerline longitudinal slot and installed the premolded ribbon-type filler. Transverse contraction joints also were cut by this machine and were filled temporarily with steel strips.

Following the joint machine, a 14-ft. hand-operated logitudinal float went over the surface. The float was worked from a pair of bridges connected by two adjustable pipe struts. After the surface had been tested with 10-ft. aluminum straightedges and had been hand-floated if necessary to correct any irregularities, it was belted with a hand belting machine. Behind this machine came finishers who worked from rolling bridges to pull steel strips out of the contraction joints and caps from the expansion joints before finishing the joint edges. When the concrete was ready, the surface was broomed with hand brooms drawn from the center line to each edge.

Curing Slab

Traffic stripe was applied as a final operation before covering with burlap. On the following morning, the burlap was removed and replaced with straw kept wet until the end of the 7-day curing period.

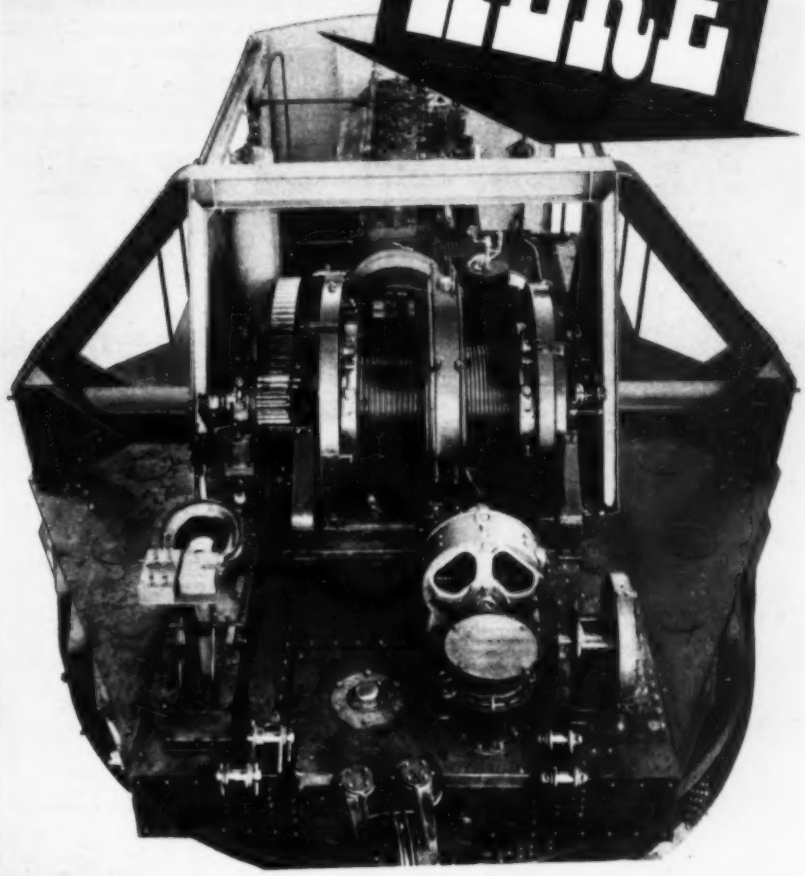
Because 3-in. pipe could not be obtained to furnish water to the dual-drum paver, as required by specifications, the contractor was permitted to use a 2½-in. line, with the provision that he employ a sprinkler truck to wet subgrade and burlap. His Jaeger triplex pump, taking water from a stream, operated at pressures up to 175 lb. per sq. in. when delivering water a maximum distance of 3¼ mi. through the 2½-in. pipe. Straw curing was sublet to Johnson & Wells, Monrovia, Ind., who also used a sprinkler truck for wetting the straw.

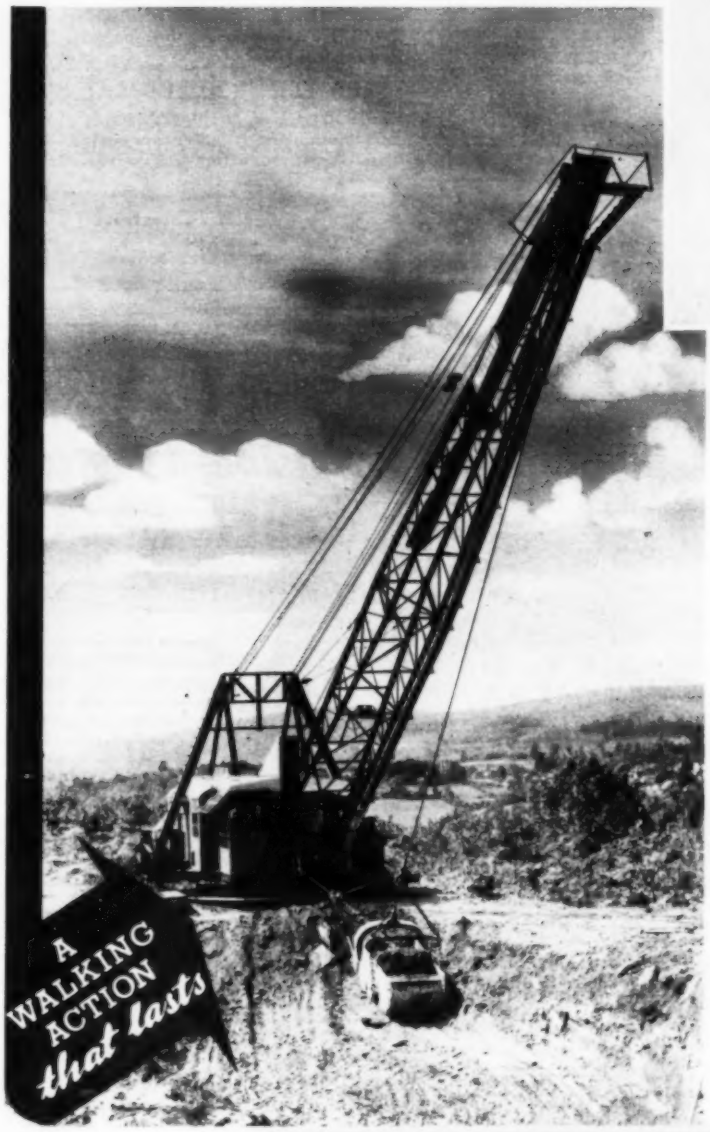
Dry materials for the paving mixer were loaded into two-batch trucks at a trackside plant equipped with a Johnson bin for sand and a Blaw-Knox two-compartment bin for large stone and medium gravel. A Johnson bulk-cement plant unloaded cement out of hopper-bottom cars and batched the material for truck loading. On batch hauling, the Conwell Sand & Gravel Co., Kokomo, Ind., subcontractor,

(Continued on page 96)

SIMPLICITY HERE

MEANS EXTRA YARDAGE EVERY SHIFT





Bucyrus-Monighan Walking Draglines have a simplicity of design that means real efficiency in all kinds of dragline work. Notice in the picture above how the machinery is located well back, to provide good rope leads and maximum counterweight effect. Notice the lack of complicated gadgets, gears or shafts. Bucyrus-Monighan simplicity means smooth performance and minimum maintenance, both in digging and in walking. Bucyrus-Monighans have proved their ability in all kinds of digging. They have the combination of speed and dependability to give the all-out performance we need for victory. They are manufactured with booms to 250 feet, buckets to 20 cubic yards.

BUCYRUS MONIGHAN

SOLD BY

BUCYRUS-ERIE COMPANY

SOUTH MILWAUKEE, WISCONSIN

(Continued from page 94)

operated a dozen two-batch trucks, Dodges, Fords and one White.

Total value of the Vogel contract, including grading and structures completed ahead of paving, was $272,000. Gross length of the job amounted to 4.2 mi., but 0.4 mi. of new embankment was not paved under the contract. Grading involved 96,000 cu.yd. of excavation and borrow. Fills were compacted to 95 percent of maximum density as determined by the Proctor method. Field tests of compacted embankment occasionally gave results exceeding 100 percent of theoretical density. Actual densities of compacted embankment ranged as high as 133.6 lb. per cu.ft. at 100 percent compaction.

Supervision

For the Indiana Highway Commission, M. R. Keefe is chief engineer, Ray H. Bower is assistant chief engineer, and H. E. Sprow is engineer of road construction. The contract described in these notes was built under the immediate supervision of Keith C. Cawood, project engineer. Operations were directed for William D. Vogel, Indianapolis, contractor, by R. R. Hart, superintendent.

★ ★ ★

Long Causeway and Bridges

Straighten Highway Route

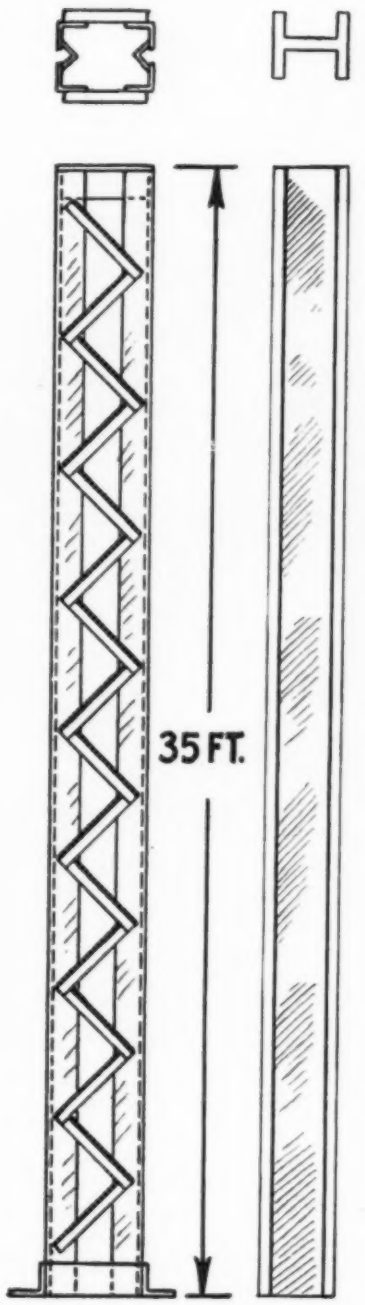
(Continued from page 58)

80-ft. navigation channels. Four remaining bridges, one over Sykes Creek on Merritt Island and three in the long causeway over the Banana River, were built under a separate, second contract by the Cleary Bros. Construction Co. Total length of the latter bridges is 1,500 ft.; the main bridge, 721 ft. long, in the Banana River, has a 170-ft. swing span over two 60-ft. channels.

Estimated total value of work in the three contracts was $746,000. Loving's Indian River bridge was valued at $307,000, and Cleary Bros. contracts for the hydraulic fill causeway and for the four bridges amounted to $134,000 and $305,000, respectively. The Florida State Road Department planned to award a paving contract for two-lane highway on the new location in time to open the relocated section to traffic for its entire length of 6 mi. by the end of 1941.

All bridges on the project are designed to carry a 24-ft. roadway and a 5-ft. sidewalk. Overall width of the decks is 39-ft. Except on the swing spans, where the roadway is open steel grating, the bridge

(Continued on page 98)



then I said to myself—

THANKS TO THE DESIGN ENGINEER —WHO'S WELDING-MINDED

You know there's one thing in this country so abundant they can't ration it—and that's the ability to think around a problem which seems final.

ALTER EGO: Just as our inability to get heavy rolled shapes would be final if we didn't have Arc Welding as our thinking partner.

Let's call it a thinking and improving partner, because in the case of this column we have not only a substitute but an improvement—for with the same weight per foot (111 lbs.) the welded column boosts the capacity by 66,000 pounds.

ALTER EGO: That improvement is just another of those extra dividends which we find following in the wake of a change to arc welding.

And this is but a single case of interest to structural engineers. The full details are being published by Lincoln in a series of Structural Studies. This one is Study No. 84. They're unbiased studies because they are developed in cooperation with Design Engineers as a contribution to modernization.

THE LINCOLN ELECTRIC COMPANY
CLEVELAND, OHIO

ALTER EGO: Literally, "one's other self"—the still, small voice that questions, inspires and corrects our conscious action.

(Continued from page 96)

decks consist of reinforced-concrete slab resting on typical steel beam spans 39-ft. long. Five 27-in. I-beams under the roadway and one 21-in. I-beam under the sidewalk rest on the caps of the concrete pile bents. Typical bents are made up of six vertical piles driven in line; end bents consist of seven batter piles, the batter being 2 in. per ft. in the Indian River bridge and 3 in. per ft. in the four bridges of the Cleary Bros. contract. Automatic Auto-Stop traffic barriers installed in approaches to the swing spans are supported by ten-pile bents in which nine of the piles, under the roadway, are battered.

Indian River Bridge

Casting and driving of concrete piles was the first major undertaking of the Loving field organization when it started operations at the site of the Indian River bridge. Specifications required completion of the structure in 225 working days. The contract called for 18,500 lin.ft. of 18x18-in. precast reinforced-concrete piles. To determine the approximate length of piles required, the contractor drove five test piles as directed by the project engineer of the State Road Department and loaded one of the test piles with steel sheetpiling to the amount of 62 tons, twice the design load for the bridge piling. All test piles and bridge piles were driven with a Vulcan No. 1 single-acting steam hammer having a 5,000-lb. ram and a 3-ft. fall; driving was aided by two 3-in. jets to which a Sterling five-stage centrifugal pump driven by a 60-hp. heavy-duty Waukesha gasoline engine supplied 300 gpm. at a pressure of 400 lb. per sq.in. The Engineering News formula was used in determining the bearing value of piles driven with the single-acting steam hammer. Piles for the bridge ranged from 50 to 62 ft. in length.

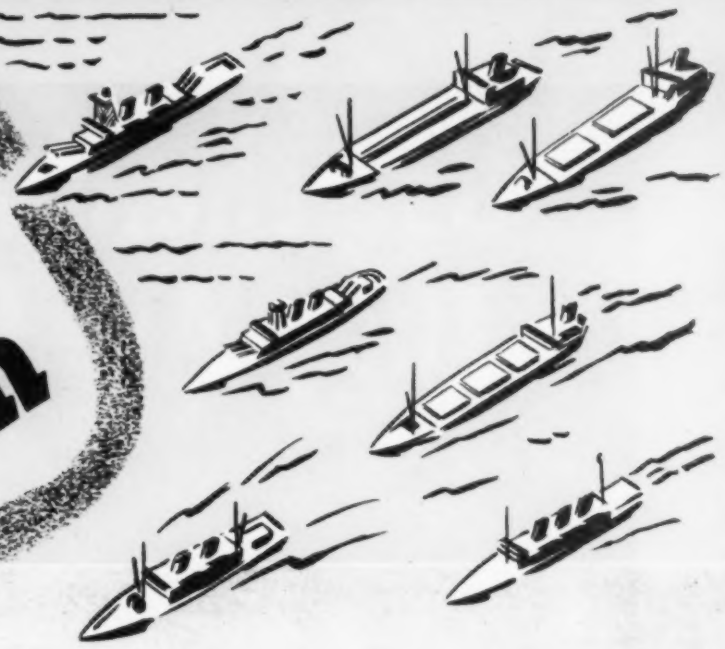
High-early-strength cement was employed in the casting of all piles for the bridge. The cement factor was 7 sacks per cu.yd., and the maximum concrete slump permitted was 2 in. Piles were cast in horizontal position, and the concrete was vibrated around the basket reinforcement (made up of longitudinal rods and spiral steel) with two portable Jackson Hydro-Spade oil-operated hydraulic vibrators. By virtue of the early-strength cement piles were ready to be picked up in slings and driven in 7 days, and the test piles were set and driven to required bearing just one week after casting. A waterproofing requirement for the bridge piles caused an additional delay of 8 to 10 days in getting them ready to drive.

Waterproofing Piles

Waterproofing of the pile surfaces consisted of five coats of water-gas tar and a final coat of refined tar. Side forms could be stripped from the piles at the end of 24 hr. After the concrete had been allowed to dry for five days following removal of forms, it was thoroughly covered with five coats of the water-gas tar applied cold with a brush. Each coat was absorbed be-

(Continued on page 100)

Athey Forged-Trak Trailers are Convoys of Construction



OF MAJOR IMPORTANCE in this war is the service of convoy ships that ply enemy infested waters, safely delivering men and supplies to distant battle fronts. The hazards that confront the brave men engaged in convoy duties provides proof of their daring courage and patriotism.

Upon them rests a tremendous responsibility – and *they're standing up to their task*. They're coming through against overwhelming odds.

In a less spectacular sense, there are other convoys – at home and with the armed forces abroad – the convoys of construction working on urgent wartime earth-moving projects.

Athey Trailers convoy material safely and dependably – get it through against toughest odds, in bad weather and footing, under the most adverse conditions.

These sure-footed transportation units ask no favors of footing or weather.

They haul extra-capacity loads through deep mud, loose earth or sand, wet clay – and *they're standing up to their task*. They do their jobs faithfully without time wasted, assist in getting Victory jobs done faster.

On essential fronts all over the world, Athey Forged-Trak equipment and Mobi-Loaders are doing their big share for the United Nations. ATHEY TRUSS WHEEL CO., 5631 W. 65thSTREET, CHICAGO, ILLINOIS.

For Better Service

—see your Athey-"Caterpillar" dealer. He is trained to keep your equipment operating efficiently, has all the tools and special shop equipment to do the job. Make your present Athey machines serve better by letting your Athey-"Caterpillar" dealer service them regularly.

ATHEY

(Continued from page 98)

fore the succeeding coat was applied. After absorption of the final coat, a seal coat of refined tar was applied at a temperature of about 80 deg.F. and was thoroughly brushed into the surface. This seal coat was allowed to dry for at least 4 days before the piles could be picked up in the slings.

All piles were handled in wire rope slings by a derrick boat carrying an Insley stiff-leg derrick operated by a Lidgerwood hoist engine. To drive the piles the contractor used a second derrick boat on which a set of steel leads 52 ft. high had been erected.

For the fender system to protect the main swing pier and adjacent pile bents at the two ends of the swing span, the contract called for 8,500 lin.ft. of creosoted timber piling and 53,000 b.ft. of creosoted structural timber. Concrete for the caps of the pile bents amounted to 576 cu.yd. and the deck required 1,220 cu.yd. Steel reinforcement for the concrete work in the bridge totaled 158 tons. The main pier of the swing span rests on untreated wood piles, driven to a required minimum bearing of 15 tons per pile.

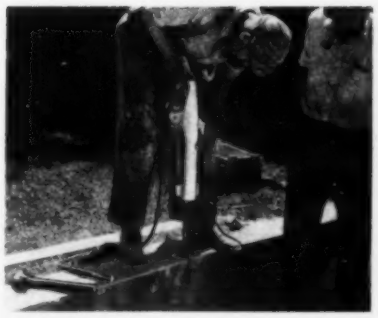
Hydraulic Fill Causeway

Although the overall length of the section included in the grade-building contract of the Cleary Bros. Construction Co. is 5.6 mi., the composite length of hydraulic fill deposited in this section is only 4.6 mi. The fill is built up to a top width of 22 ft. with theoretical side slopes of 12 to 1. In the long stretch across the Banana River, almost 3 mi. from bank to bank, building up a fill of this cross-section required a large volume of pumping. The grade of the highway is 6 ft. above mean low water, and the river has an average depth near the center of about 6 ft. In this area the theoretical cross-section called for placement of about 70 cu.yd. per lin.ft. Actually the embankment slopes did not hold to the theoretical template for which payment was made, and it is estimated that the dredge pumped about 25 percent excess material over that for which payment was allowed. The bid price for fill was 11.49c. per cu.yd. About 13,000 cu.yd. of dry fill was included in the same contract.

Under the provisions of the contract, 175 working days was specified for completion. The contractor brought in the 15-in. diesel dredge, Dade, of the Palm Beach Dredging Co., which pumped through an average pipe line 1,500 ft. long and a maximum line 3,000 ft. in length, extending across Merritt Island. Working through the fall and winter, the dredge completed placement of the 1,000,000 cu. yd. of fill, plus the excess, in less than 5 months. All dredged material was excavated from the Banana River on the south side of the causeway, where the dredge obtained some protection from the dike as it was constructed. Prevailing winds during the fall and winter are from the north. The discharge line was extended parallel with the fill.

Concrete pile bents and steel beam

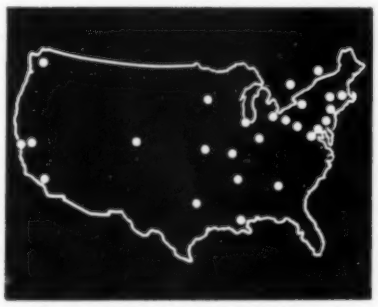
(Continued on page 102)



DRILLING IN CONCRETE with Black & Decker #36 Hammer to make room for swinging gate. With a 1" star drill, this operation is more than fifty times as fast as hand operation!

DRILLING 1" steel plate with ¾" Black & Decker Heavy Duty Drill. There are over 30 models of Black & Decker drills for all types of drilling in wood or steel.

SAWING 50 rafters in 45 minutes with Black & Decker Electric Saws on a large construction project. Black & Decker ball-bearing telescoping guard means maximum safety, too.



TOP SPEED SERVICING — One of the 26 Factory-owned Service Branches, is near you for speedy repairs and genuine repair parts. This is the largest service system in the electric tool industry.

FREE HANDBOOKS FOR BUILDING CONTRACTORS

Send for the building Handbooks you need showing dozens of applications of Black & Decker Portable Electric Tools. The Black & Decker Mfg. Co., 759 Penna. Ave., Towson, Md.

- ☐ General Tool Catalog
- ☐ Hammer Handbook
- ☐ Saw Handbook

SAWING with #85 Black & Decker Quick-Saw. Such equipment is ten times faster than hand-sawing and provides maximum safety.

Black & Decker Tools Will Keep You On Top of the Job!

There is only one possible construction method these days — the *fastest!* Black & Decker Portable Electric Tools give you just that, keep you on top of schedules

because *Black & Decker Tools can be bought on the job from leading distributors in all principal cities —*

because *Black & Decker makes 120 different tools, each the right style, each powered right for the job —*

because *Black & Decker Tools are quality built to stay on the job, with less breakdowns no matter how hard you use them —*

because *Black & Decker Factory-owned Service Branches (26 of them, from coast to coast) using genuine Black & Decker parts, are all set for fast delivery of needed repairs.*

Get hold of your Black & Decker Distributor today for any demonstrations or advice you want. Or write direct for information to: The Black & Decker Mfg. Co., 759 Pennsylvania Avenue, Towson, Md.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

(Continued from page 100)

spans similar to those in the Indian River bridge were called for in the four bridges built by the Cleary Bros. Construction Co. A single exception occurs at the Banana River west relief bridge, where the bents employ steel H-piles concrete-jacketed to 18x18-in. cross-section. Steel piles were needed to penetrate a rock shelf about 3 ft. thick encountered at about El. —9 at this location. The swing span in the main Banana River bridge is a shorter duplicate of the swing span in the Indian River bridge. Lengths of the four bridges, made up of 39-ft. I-beam spans, are as follows: Sykes Creek, 390 ft.; two Banana River relief bridges, 195 ft. each; main Banana River bridge, 721 ft., including the swing span measuring 174½ ft. overall.

Specifications for the contract, signed Jan. 29, 1941, stipulated completion in 200 working days or in 175 active days on which weather conditions permitted prosecution of field operations. Estimated quantities included: 12,400 lin.ft. of 18x18-in. precast concrete piling, 4,447 sq.yd. of waterproofing for the concrete piles, 2,000 lin. ft. of untreated wood piling for the swing pier foundations and falsework, 14,530 lin. ft. of treated wood piling, 29,190 b. ft. of treated structural timber (16-lb. treatment), 580 cu. yd. of concrete for pier caps and 1,195 cu. yd. for bridge decks, 151.3 tons of reinforcing steel, 382 tons of structural steel for the I-beam spans, 175 tons of structural steel for the swing span, and 25 tons of machinery and castings for the swing span. Bulkheads to retain the fill at the ends of the bridges called for 189,000 lb. of steel sheetpiling and 74,290 b. ft. of treated timber sheetpiling.

Test Borings

Pile lengths were determined by driving five unloaded test piles, one at Sykes Creek and four at Banana River. Including 38 concrete-jacketed H-piles at the west relief bridge, the contractor drove 260 piles varying in length from 30 to 40 ft. To ascertain the character of the substrata, test borings previously had been made at the bridge sites to depths ranging from El.-70 to El.-134. These borings had penetrated strata of the following typical classifications, in order from top to bottom: (1) stiff clay, shell and a small amount of sand; (2) shell and sand; (3) sand with scattered small nodules of fairly soft rock; (4) sand with a very small amount of shell; (5) soft clay, shell and a small amount of sand, and (6) sandy shell marl with quite numerous small nodules of indurated shell marl.

Methods of pile casting employed by the Cleary Bros. Construction Co. for these bridges were similar to those used at the Indian River bridge. For driving the piles, however, the contractor used a crawler crane operating on a temporary falsework trestle at each site. This rig was equipped with an auxiliary double-drum hoist mounted above the cab roof in exposed position to facilitate handling of two jets

(Continued on page 106)

GOOD BLASTING

Will Make It Last Longer!

Today, when additional equipment isn't available, and repair parts are hard, if not impossible, to get—it's becoming more and more difficult to maintain full production and prevent shutdowns. Proper use of explosives becomes more important than ever.

Better blasting usually means that shovels can be made to handle more, and last longer without repair.

Atlas Technical Representatives often have been able to help by cooperating on a study of blasting methods. They can help you, too—and are always at your service.

ATLAS EXPLOSIVES
"Everything for Blasting"

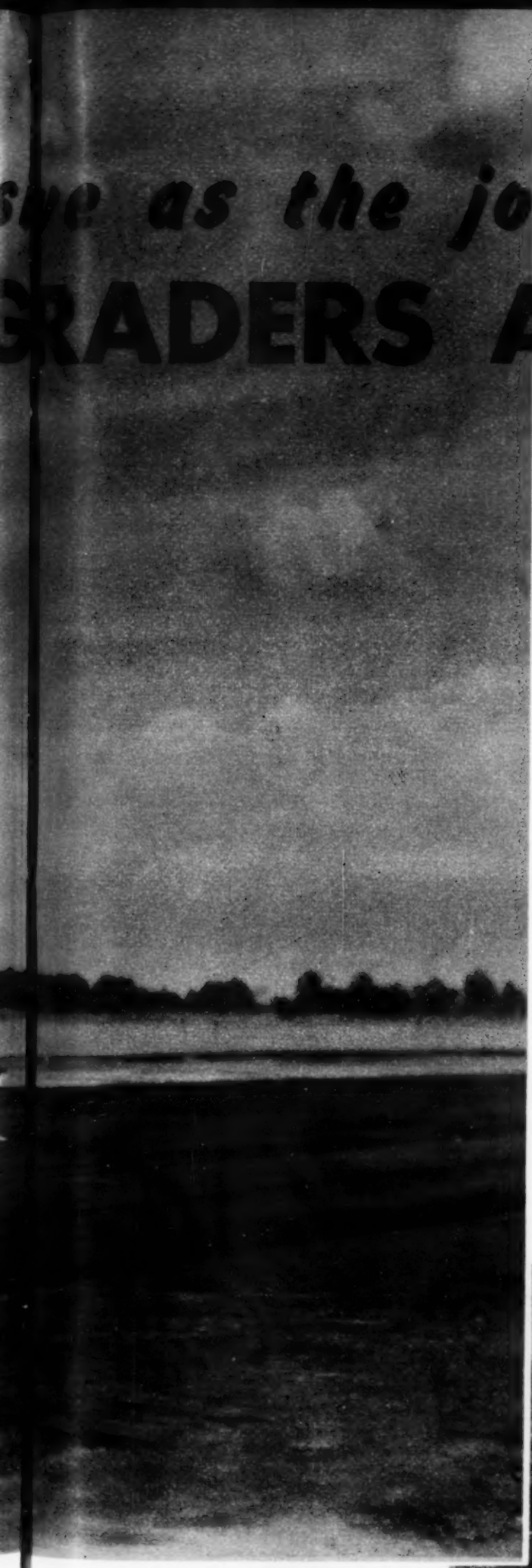
CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. • Offices in principal cities • Cable Address—Atpowco

GALION ROAD MACHINERY
points to better roads

THE GALION IRON WORKS & MFG. CO

Main Office and Works: Galion, Ohio



...ye as the jobs they're doing
...GRADERS AND ROLLERS

Today many important war construction jobs are being rushed to speedy completion with Galion road machinery. The inbuilt quality of Galion Graders and Rollers is proved in day after day of constant service — of long hours — of uninterrupted work on vital jobs. Here's equipment that is not only valuable because of the work it does but to the contractor using it, due to its speed, capacity and low operating cost.

Left — *Galion Tandem Roller working on runways in airport construction.*

Below — *Galion No. 101 Motor Grader working on access road near large Victory plant.*

...G. CO.

GALION ROAD MACHINERY
points to better roads

(Continued from page 102)

by the hoist operator. The crane set the piles and drove them with a Vulcan No. 1 hammer. Pile driving started at the Sykes Creek bridge on Merritt Island and proceeded eastward to the other bridges in succession.

Direction

J. H. Dowling, state highway engineer, heads the Florida State Road Department. The project engineers in charge of the various contracts described were: D. M. Roberts, Indian River bridge; Uriel Blount, hydraulic fill causeway; and Robert L. Riggs, Banana River and Sykes Creek bridges. E. F. Blankenship was superintendent in charge of constructing the Indian River bridge for T. A. Loving & Co., Goldsboro, N. C., and J. H. Langford was superintendent responsible for the work on the two contracts of the Cleary Bros. Construction Co., West Palm Beach, Fla.

* * *

Beehive Magazines

(Continued from page 62)

Each beehive magazine has an entrance equipped with a vented steel door similar to that used in standard igloos. Flared wing walls in front of the door provide a wide loading and unloading platform for trucks; the wing walls hold back earth fill which is placed over the dome to a minimum depth of 2 ft. A ventilator of precast concrete, set on a metal base ring at the top of the beehive, provides for circulation of air; the dome shape eliminates dead air pockets and resultant condensation of moisture detrimental to stored munitions.

Frame reinforcement of the dome utilizes standard rolled open-web steel ribs 4 in. deep, weighing 3.4 lb. per ft. The ribs, installed around the polygon at every intersection of chord lines, rise from the base of the dome to the ventilator ring, to which the upper ends are welded. Each truss rib is made up of two curved segments which are joined by welding in the field at the point of compound curvature.

Circumferential reinforcement of the dome consists of horizontal $\frac{3}{8}$-in. and $\frac{1}{4}$-in. wires welded to the trusses. During the construction experiments, an attempt was made to apply the wires by unwrapping them from a spool on a traveling carriage, but experience demonstrated the impossibility of using sufficient tension to keep the wire chords from sagging without distorting the reinforcing cage. The method accordingly was changed to using straight chord lengths of wire, welded at both ends to the trusses. Although this method required twice as many welds as the one first attempted, it proved more satisfactory.

During erection of the reinforcing cage,

(Continued on page 108)

WIRE ROPE LASTS LONGER WITH PROPER CARE

8 tips on lubricating WIRE ROPE

You'd have to look a long way to find a piece of equipment able to stand up under the terrific abuse which wire rope handles every day as a matter of course. Just because wire rope *can* take it, however, is no reason to subject the rope to abuses which could be avoided.

Take lubrication, for instance. You wouldn't think of running your car without plenty of oil in the crankcase. Wire rope, too, is a machine. In action, its many individual wires move relative to each other and twist around their own axes. To protect these "bearing" surfaces from rust and from wear, follow the simple rules outlined below. You'll be well repaid in longer service.

1. Clean wire rope carefully before lubricating it. Remove grit, dirt and other foreign matter with kerosene or gasoline and a stiff brush. Another method is to pull the rope through a tightly-wrapped swab.

2. If the rope has been working in a wet atmosphere, it may be coated with hydrated rust—a slimy film that cannot be removed until the rope is *thoroughly* dried out. To apply oil or grease on top of hydrated rust is simply wasted effort.

3. Choose a lubricant which is suited to the size and construction of rope, and to the working conditions. A stiff rope, with fewer, larger wires, requires a heavier lubricant, in general, than a more flexible rope with a greater number of wires.

4. When applying heavy lubricants to wire rope, thin them out by heating, so as to get the desired penetration. Use an ordinary metal vat or box with a gas flame under it. Pull the rope slowly through the hot lubricant. A sheave, partly submerged in the vat, will hold the rope down so that the lubricant can penetrate more readily.

5. If you are not using a heated vat, or a special drip-oiling device, the lubricant may be applied with an oil can or a paint brush, dipped in the lubricant.

6. Don't just apply any-oil-that's-handy to your wire rope. Some lubricants have an acid base and will actually eat into the wires, thus seriously damaging the rope. Be certain that the lubricant you apply to your rope is the correct one—that it won't "fight" with the lubricants already in the rope.

7. Ropes that operate at elevated temperatures require a lubricant that will hold its body at the working temperature. Use a fairly heavy lubricant, heat it above the working temperature of the rope, let it penetrate completely among the wires. It will cool and thicken at room temperature. But in service, the heat will thin out the lubricant to the right consistency.

8. Never let your wire rope rust or become dry of oil. Watch it carefully in service. Experience will show you how often to lubricate for best results. Every type of wire-rope job presents its own lubricating problem. If the load is heavy—if the rope works at high speed—bends frequently around sheaves—is exposed to moisture, grit or corrosive fumes—be particularly careful about lubrication. Remember, wire rope is a machine, and machines don't last long without proper lubrication.

BETHLEHEM STEEL COMPANY

(Continued from page 106)

the open-web truss ribs are temporarily fastened to the concrete base slab, but the completed dome has no connection to the base. The bottom joint between shell and slab is sealed with mastic. Elimination of all ties betwen the dome and the foundation slab permits free expansion and contraction of the shell and prevents introduction of any stresses into the dome as the result of slab settlement. The dome is free to rise and relieve explosive pressures in event of an internal blast or to shift on its base in case of an explosion in a nearby magazine, thus reducing damage.

Erection Equipment

Procedure for construction of the beehive magazine has been planned to eliminate use of power equipment except for the few hours' work involved in the three operations of excavating, concreting and backfilling. A manually operated screed strikes off the concrete base slab. Templates are provided to locate accurately the anchor bolts for the extensible erector arms which support the truss ribs. These arms and the center mast are easily set up by workmen. The forms, both steel and wood, are designed in panels which can readily be erected and stripped by hand.

To facilitate erection of the steel cage and of the outside forms, as well as placing of concrete, the constructors have devised a highly useful traveling carriage, or exterior scaffold, which rotates about the top of the central erection mast. This merry-go-round carriage, curved to the shape of the dome and mounted on two wheels, is of welded tubular construction weighing only 950 lb. It can be assembled and set in place by hand.

Construction Procedure

To begin construction of a beehive, the only services required from a survey party are location of the center point and of an axis line bisecting the entrance, for orientation, and establishment of grades. Concrete base slabs may be completed as far in advance of domes as a contractor thinks desirable. Rate of construction of the domes depends upon the number of sets of forms (and accessory equipment) available. Employing the construction procedure developed during the experiments, a set of forms is estimated to be capable of completing a dome every four days. Steps in the construction of a complete magazine, from start to finish, are as follows:

1. Excavate and prepare subgrade.
2. Install porous fill for drainage under slab.
3. Set ring form for 3-ft.-diam. hub at center of base and set circular form around outside circumference of slab. Center concrete ring is fitted with two anchor bolts which will fasten base plate for mast. This base plate has ¾-in. center pin and two dowels to locate mast and hold it against overturning.
4. Concrete 3-ft. hub at center to carry

(Continued on page 110)

(Continued from page 108)

screed used in striking off rest of base slab.
5. Install reinforcement in slab.
6. Place slab concrete, striking it off with manually operated screed carried by inner hub and outer form.
7. While concrete is soft, set anchor bolts for radial erector arms with template rotated about center pin. Form drainage gutter about 6 in. from inside of shell.
8. Cure concrete slab.
9. Lay out intersections of radial and chord lines for inner form location; these points are set from the center pin before it is covered with the mast.
10. Set mast and erect exterior traveling carriage. Erect tubular steel erector arms, which are equipped with clevises to support the open-web truss ribs.
11. Erect rib segments and weld them at point of compound curvature and to ventilator base ring on the mast.
12. Apply and weld circumferential wire reinforcement.
13. Erect inside form. Timber shores are installed under the flanges of the top panels of the inside form; these are the only timber shores used in the construction. The telescopic erector arms are retracted, and wood wedges are driven into the clevises to support the inner forms.
14. Place steel reinforcement at entrance in piers, slabs and walls.
15. Erect complete outside forms for magazine.
16. Place concrete in thin-shell dome and in walls and piers around door.
17. Strip outside forms next morning.
18. On following morning, remove inside form and all erection devices.
19. Install agricultural tile drain (around base) leading to dry well. Install copper ground rods for lightning protection.
20. Apply curing compound on concrete.
21. About one week later, apply waterproofing and built-up roofing to dome. Hang door.
22. Place backfill and topsoil.

Progress of construction under this procedure could not be foretold accurately in advance of application on a large project, but the experiments indicated that a complete reinforcing cage for a beehive could be erected in one day and that one day was sufficient for the erection of a full set of forms, inside and outside.

Experiments on Forms

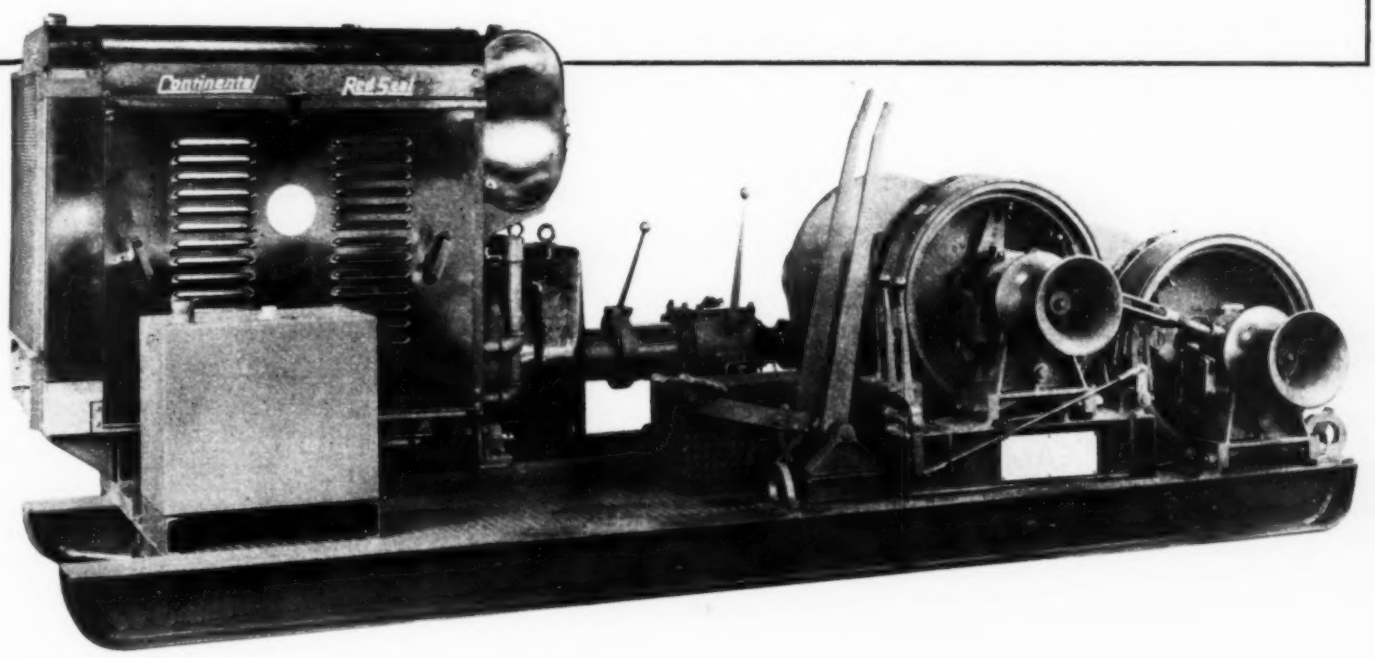
In the process of developing panel forms which would fit the surfaces of the polygonal, two-radius dome, and which would be capable of repeated use, the constructors first made preliminary tests of five different designs of wood forms. Each type was built in a quantity sufficient to inclose two-sixteenths of a sixteen-sided polygon. The form panels were numbered, and the forms were erected and dismantled a number of times to determine their practicability on a production job. The best features of these forms were combined in the full set which finally was built to inclose an entire dome.

Because of the dome shape of the

(Continued on page 112)

On the Job

AT PEARL HARBOR



HERE is another important application of dependable Continental Red Seal Power for construction and reconstruction work. Equipped with Twin Disc Convertors the power is transmitted to winches by water-cooled fluid transmission. This overcomes a torque five times greater than the torque of the engine.

For dependable power at all times, always specify dependable Red Seal Power.

CONTINENTAL MOTORS · Powerful as the Nation · AMERICA'S STANDARD

Continental Motors Corporation

MUSKEGON, MICHIGAN

(Continued from page 110)

structure, it was at first suggested that spreader-ties need not be installed between the inner and outer forms. The theory was offered that the thrust of the concrete against the outer form could be resisted by circumferential steel bands. Because of its obvious advantages, the theory was given a practical test on a full-size beehive. It quickly proved impracticable, as concrete could not be placed at a sufficient number of points around the dome to maintain a balanced thrust in all parts of the circumference, and the form panels were distorted as concrete was deposited. Spreader-ties were installed in the wood panel forms which were used successfully in concreting the complete beehive magazine.

Field experiments were carried on simultaneously to determine the best design of steel form. As one feature of these experiments, tall, tapered steel panels were tried at the chord intersections of the dome, with smaller filler panels between them. This design proved less satisfactory than the panel arrangement finally worked out for the wood forms, and the steel forms were redesigned to provide a full ring of panels of uniform height for each tier.

Construction operations have been so simplified as a result of the practical experiments on forms that the Corbetta organization now feels that green labor could be trained in a few days to erect and strip the forms economically. As a conservative estimate, it is stated that the forms, either steel or wood, could be erected, stripped and transported to the next magazine at a labor cost of less than 10c. per sq.ft. of contact area.

Available to Contractors

To make the first demonstrations of beehive construction on War Department projects, the Corbetta Construction Co. received orders to build 250 of the units at two locations. These jobs are now in progress. To build magazines at a projected rate of three units per day, the contractor equipped the first job with twelve sets of forms, six in wood and six in steel.

Because other contractors bidding on ordnance depots had not had the benefit of experimental work on forms and erection devices, the Corbetta Construction Co., in order to encourage wider use of the economical beehive design, offered to supply equipment and services for the more difficult parts of the work as a subcontractor on a fixed-price basis. Under this proposal, the subcontractor would furnish and erect the reinforcing cages and would supply the forms for as many units as required. The general contractor would retain full control of the forms and of form erection and concreting operations. As the subcontractor would be under penalty to erect reinforcing cages as far as desired in advance of dome construction, progress could not be impeded by the subcontractor's operations.

Louis P. Corbetta, of the Corbetta Con-

struction Co., New York City, originated and patented the design of the beehive storage magazine, which was turned over to the War Department without cost for its unrestricted use. The idea of investigating a beehive design to see if it might be more economical than standard igloos was suggested to Mr. Corbetta by Lt. Col. B. F. Vandervoort, Corps of Engineers, U. S. Army. Engineering development of the original Corbetta design was carried out by Francis R. MacLeay, chief engineer, Corbetta Construction Co., and the practical construction experiments described in these notes were made under the direction of Fred Foss, project manager, Bob Sanderson, Jim Little and R. Lanzolotta.

★ ★ ★

Industrial Bridge

Built to Carry Conveyor Lines

(Continued from page 51)

with power lines on both sides. Each side of the first section came broken down in halves, for ease of shipping and handling. The two halves of each side then were joined in the street for placing in position.

A photograph illustrates how an 8x8-in. timber about 40 ft. long was chained to each side covering the joint to stiffen the truss while it was being raised up. The technique of lifting the section was as follows: Each side was assembled on the street, running lengthwise along the street it later was to cross. Each side then was hoisted up to the required height of 30 ft., in line with the street, and then was swung around so that it spanned the street. Each truss weighed 5 ton (approximately 100 lb. per lin. ft.). Conventional 10-ton cranes were used in the hoisting operation, and in connection with placing the first section it was necessary to build a 10-ft. extension on one of the crane booms.

The operation went so smoothly that each truss of the first section was lifted, swung, set, and connected in place within a half hour. The method used made it possible for the entire job to be performed without cutting the power in the overhead lines. One of the lines to the left is a 2,300-v., 3-phase, 60-cycle power line which runs into the sub-station in the main plant. The lines shown to the right, of which six are power wires, previously had been lowered 10 ft. in order to clear the lower side of the bridge. This also was done without shutting off the power.

Cross beams were set up on floors and ceilings at 10-ft. intervals, and the timbers used in hoisting trusses were removed after cross beams were set in. The ceiling beams shown are 12 ft. by 4 in., weighing 16 lb. per lin. ft., and the floor beams are

(Continued on page 114)

(Continued from page 112)

12 ft. by 6½ in., weighing 25 lb. per lin. ft.

The second bridge section between the two towers atop the rubber plant is 110 ft. 8¼ in. long—the length of all the other sections except the first and the last one. The latter, which spans a creek and railroad siding and connects with the vitreous enamel plant, is 185 ft. long on one side and 170 ft. on the other. (The difference is explained by the fact that this section fits into the corner of the vitreous plant and it was necessary for one side to extend further than the other.)

Features of 90-Deg. Turn

From the starting point of the bridge at the main assembly building, to the turn, shown in one of the photographs, there is a 12-ft. drop in elevation over a distance of 542 ft., 2¾ in. At the corner, the ground is 7 ft. lower than at the starting point of the bridge so the span at the turn is approximately 25 ft. from the ground. In the 542-ft. length complete provision is made for extreme heat and extreme cold. The 4-in. expansion provided in this section is taken up by expansion joints on rollers between the various sections. This same expansion feature had to be allowed for in the conveyors in the bridge.

Specially constructed inside corners of the the bridge were provided at the turn. This "picture-frame" bracing permits the roller conveyor of the bridge to run through it, instead of having to swing wide into the aisle at the turn. The turn is approximately a 90-deg. angle, too sharp for a conveyor turn, but by the special construction shown, the turn is made by two 45-deg. angles with a short straight stretch between. This short straight portion extends over a small porch built off the bridge, in triangular shape, at the inside of the turn.

Long Arch-Truss Span

From the corner tower to the enameling plant the bridge is entirely level. The last section of the bridge adjacent to the enameling plant is of the arch type of construction because of its length of 185 ft. It crosses a creek and a railroad siding, with a clearance 6 in. greater than the 22 ft. required by the railroad. A conservancy project now under contemplation would entail considerable widening of the creek, and in the bridge construction the footers were set back far enough to allow for this contingency.

An interesting sidelight on the task of placing the 185-ft. section was that it was put up in three sections — and the middle one was raised first. A very high pole was erected in the exact center of the creek, and was heavily guyed to keep it upright. The inner section was pulled up to the top of this pole, and then two cranes, one on each side of the creek, lifted the two end sections. Structural steel workers then climbed up on the pieces and fitted them together. Thus this longest section actually was assembled up in the air.

As is the case in the other straight sec-

tion of the bridge, the ends are fastened solid and there is a provision made for 3-in. expansion in the 406-ft. length between the turn and the vitreous plant.

After the frame construction was completed, the job of applying the roofing and siding began. Corrugated iron roofing in sheets 30-in. wide was placed on the bridge, and to prevent any of these sheets ever wearing loose or blowing off in a storm, the straps holding them down are rivited to the underside of the steel frame work. The metal siding is a 42-gage material with protective weather coating.

Three Conveyors

After the roofing and siding were completed, the job of building the conveyors was started. A photograph shows how the roller conveyor curve was built across the inner turn of the bridge. The roller conveyor is approximately 4-ft. wide, is reversible in direction, and has a fixed speed of 40 ft. per min. Beside this is a 6-ft. aisle for electric trucks and pedestrians, and this is built of checkered plate to prevent slipping. Next is the endless overhead conveyor, with two tracks carrying suspended baskets. The overhead conveyors have a variable speed up to 30 ft. per min. There is a 5-ft. clearance between the two tracks and a 6-ft. radius is maintained for turns. The track closest to the bridge siding has a 30-in. clearance.

Approximately 376 tons of steel were used in the entire construction, and the bridge flooring is made up of 16,500 sq.ft. of steel decking. The bridge has continuous windows on both sides, with approximately 300 windows and more than 3,000 individual panes of glass.

★ ★ ★

Maintenance

Of Bituminous

Macadam Highways

(Continued from page 69)

oughly rolled. In some cases an adequate foundation is provided by a 4-in. layer of sandy gravel overlaid with 8 to 10 in. of stone fill, thoroughly rolled.

A broken stone base course usually 4½ in. thick is specified for state highway work. The stone should have a maximum allowable wear of 35 percent by the Los Angeles abrasion test (A.A.S.H.O. Standard Method T-96-38), and should be composed of 2¼-in. stone or a combination of 2¼ and 1½-in. stone. If the mixture of 2¼ and 1½-in. stone is used, it should consist of not more than 40 percent 1½-in. stone. The shoulders should be built of sufficient width and height to hold the

(Continued on page 116)

(Continued from page 115)

stone in place and should be rolled with the foundation course, the base course, and the top course. The stone should be spread and rolled to a true cross-section of the finished road, any depressions or irregularities being covered with additional stone and re-rolled until the surface is true and unyielding. The course then is bound with clean sand or stone dust, the rolling operations being continued and the sand being applied in small quantities until it is just below the top of the stones. The rolling should be done with a 12-ton roller.

The top course is usually constructed 2½ in. thick, and 2¼-in. broken stone of a harder quality than the stone used in the base course is specified, a maximum allowable wear of 25 percent by the Los Angeles abrasion test being allowed. The stone is spread and rolled to a true cross-section of the proposed road in a manner similar to the method used in rolling the base course until the surface is true and unyielding. Excessive rolling which would tend to crush the stone should be avoided. Before any bituminous material is applied, all dirt or other foreign substances must be removed from the surface and any unsuitable broken stone must be removed and replaced with clean stone. The stone should be perfectly dry before the bituminous material is applied.

Applying Bituminous Material

The bituminous material is uniformly applied on the top course of stone by means of a pressure distributor capable of spraying, if required, for a width of 15 ft. at a pressure between 40 and 60 lb. per sq.in. The rate of application is 1½ gal. per sq.yd. The surface then is covered with ⅝-in. key stone, the stone being applied in light applications as the rolling continues, and ½-in. pea stone then is added in sufficient quantity to fill the voids completely. Before the seal coat is applied any surplus stone is swept from the surface. The seal coat then is applied in the same manner as the penetration coat but in two applications at the rates of ½ and ⅜ gal. per sq.yd., respectively. The first application of bitumen is covered with ½-in. pea stone in sufficient quantity to take up excess bitumen, and the surface is given a thorough rolling. After the second application of bitumen, sufficient ⅜-in. pea stone is spread to take up all excess bitumen and the surface is given a final rolling. After the seal coat is applied, any surplus bituminous material on the shoulders is removed in order to permit the shoulders to be rolled in conjunction with the finished surface.

The Massachusetts Department of Public Works has used asphalt to a much greater extent than other bituminous materials. The top course of broken stone is penetrated with asphalt cements (A.A.S.H.O. designation M-20-26), 85 to 100 penetration being specified for the summer months, and 100 to 120 penetration in the spring and fall. A quick-setting type of asphalt emulsion (A.A.S.H.O. designation M-51-37) is used for the seal coat.

In the interest of elimination of noise

(Continued on page 118)

How can time be saved? How can we make the best use of our raw materials now so urgently needed for so many purposes?

With Wire Rope the answer is in using the quality, construction and type that can be installed the quickest . . . that will deliver the most hours of work per pound of steel.

You can depend on Preformed "HERCULES" *(Red-Strand)* Wire Rope for maximum efficiency. As it is easier to handle, it can be installed quicker. In addition to saving time, its longer service saves steel for other vital uses.

As Preformed "HERCULES" is furnished in both Round Strand and Flattened Strand constructions, there is, in this one grade, a right rope for every heavy duty purpose. You will like its smooth spooling . . . its stamina . . . its dependability.

In order to help all wire rope users obtain maximum service from their wire rope, we publish an illustrated booklet "Practical Information on the Use and Care of Wire Rope". We shall be glad to send a complimentary copy to anyone interested.

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS — ESTABLISHED 1857

5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U.S.A.

NEW YORK . . . . . 90 West Street
CHICAGO . . . . 810 W. Washington Blvd.
DENVER . . . . . 1554 Wazee Street

"HERCULES" (RED-STRAND) WIRE ROPE

SAN FRANCISCO . . . . 520 Fourth Street
PORTLAND . . . . 914 N. W. 14th Avenue
SEATTLE . . . . . 3410 First Avenue South

(Continued from page 116)

caused by the passage of fast-rolling pneumatic tires over the road surface, which has been the principal criticism of the bituminous macadam pavement ,the seal coat is made in two applications under recently adopted specifications, instead of one, as formerly. The use of the smaller $\frac{3}{8}$-in. stone in the second coat, together with the application of two coats instead of one, eliminates the open texture appearance of the finished surface and reduces the noise to a minimum.

Costs of Maintenance

That the maintenance of bituminous macadam pavement is an important factor in the Massachusetts Department of Public Works Maintenance Department is indicated by the number of square yards of this type of surfacing compared to other types. Altogether there are approximately 30,000,000 sq.yd. of state highway surfacing in Massachusetts. Of this amount, 16,500,000 sq.yd. are bituminous macadam. The bituminous macadam surfacing is composed of approximately 15,500,000 sq. yd. of asphalt macadam and 1,000,000 sq.yd. of tar macadam.

The ordinary maintenance surface cost per square yard per year averaged over the 5-year period from 1936 to 1940, inclusive, of the more common types of surfacing in use by the department is shown in the accompanying table.

Costs of Surface Maintenance

Type of Surface	Aver. Maint. Cost per sq.yd. per year 1936 to 1940 inc.
Sheet concrete (reinforced concrete base course with plain concrete surface course separated by a layer of burlap	$0.0029
Dual Type (2 outside lanes of reinforced concrete, middle lanes bituminous macadam asphalt)	0.0035
Bituminous concrete	0.0066
Reinforced concrete	0.0070
Bituminous macadam asphalt	0.0076
Granite block	0.0079
Road mix	0.0118
Obsolete Types	0.0310

Maintenance cost of bituminous macadam asphalt at $0.0076 per sq.yd. is slightly higher than it has been running in the past. This is due to the number of surface treatments applied to bituminous macadam asphalt surfaces during the past few years, and it is not expected that this trend will continue. In spite of the slightly higher maintenance costs of the past few years, this type of surface is considered very economical in view of the low initial cost of the pavement. Averages of construction costs of bituminous macadam asphalt surfacing, including the base course, in recent years indicate a cost of about $1.10 per sq.yd.

The amount of maintenance work necessary on a well-built bituminous macadam asphalt road is small, a mile of 30-ft. road requiring a yearly average outlay of a little over $130. I am familiar with many miles of bituminous macadam asphalt pavement 20 to 25 years old still in excellent condi-

tion, some of which have never received a surface treatment. Occasionally, however, due to an extremely open surface type of construction or to years of subjection to fast-moving traffic, a surface treatment becomes desirable.

The open-surface type of construction was developed as the result of an attempt to secure an extremely non-skid surface by the use of a minimum of pea stone at the time of penetration, leaving the 2½-in. stone exposed as a wearing surface. In this attempt the surface was sometimes inadequately sealed, resulting in the need of surface treatments after a few years. The construction of this type of surface is the cause of the recent increase of surface maintenance costs for bituminous macadam asphalt. The present tendency is to use more pea stone to insure the complete filling of the voids and to attain thereby a tighter surface. It is now felt that with the development of the double seal coat the surface thus attained is just as skid-proof, much less noisy, and certain to wear longer before a surface treatment is needed than the more open type of surface.

A close examination of a bituminous macadam asphalt road needing a surface treatment reveals a honeycombed surface no longer tightly sealed against the elements. If a surface treatment is not immediately applied, the 2½-in. stones begin to work loose and raveling of the surface begins. Before a surface treatment can be made it is necessary to patch areas where raveling has occurred and bring the road to a true cross-section.

Surface Patching

Various grades of bituminous material are used in patching asphalt macadam surfaces. In the early spring, in cold wet weather, temporary patches are made with a premix material composed of broken stone aggregate which is varied in size according to the size of the hole to be patched from about 1½-in. stone down to ¼-in. stone, and cold patch tar. In warmer weather similar premix patches of small areas are sometimes made, using rapid-curing, cut-back asphalt of relatively low viscosity, instead of the cold patch tar.

Under favorable weather conditions permanent patches are made of asphalt cement (A.A.S.H.O. designation M-20-26) to match as nearly as possible the texture of the surrounding surface. All loose material is removed from the area to be patched, and the resulting cavity is carefully cleaned. The area is generally painted with the bitumen, and broken stone graded to the requirements of the area deposited therein. The stone is thoroughly tamped or rolled and keyed and the bituminous material (frequently 85 to 100 or 100 to 120 penetration grade) potted in or applied with a spray unit.

Except to correct for roadbed settlements or settlements due to excavating for underground public utility structures, patches of more than 2 or 3 sq.ft. in area are seldom necessary on asphalt macadam

(Continued on page 120)

(Continued from page 119)

surfaces. If they become necessary, the surface course is entirely removed and a new surface is built up from the base course exactly as in new construction work. The area to be patched is laid out by the use of a chalk line or straightedge, and the edges cut vertically with square corners. A tack coat is generally applied to the edges before the broken stone is placed.

The unit cost of a patch of this type varies not only with the location, which is a factor of the material cost, but with the size and proximity of one patch to another. The cost would vary upward from a low of about $1.50 per sq.yd.

Surface Treatment

Before the surface treatment application which is made after completion of necessary patching, all sand and other undesirable material must be removed from the road surface. If considered necessary, the road is swept with mechanical sweepers or with hand push brooms.

Rapid-curing, cut-back asphalt (A.A.S.H.O. designation M-81, latest revision), grade RC-3, is used with a great deal of success in the spring and fall, and grade RC-4 in the summer. Asphalt emulsion (A.A.S.H.O designation M-51-37) is also highly recommended.

The surface treatment application is made at a rate of from 0.20 to 0.40 gal. per sq.yd., the rate having been previously determined by examination of the road. One-half-inch pea stone is spread over the freshly applied asphalt at a rate of from 20 to 40 lb. per sq.yd, depending also on the previously determined condition of the road and the quantity of asphalt applied. If further refinement is considered necessary, the pea stone is more evenly spread over the surface before rolling by use of a strip of close woven wire fencing 6 to 8 ft. wide and 8 to 10 ft. long dragged over the surface. The road then is rolled just enough to insure the settlement of the pea stone into the interstices between the larger stones, and to smooth out and thoroughly compact the surface treatment material. Too much rolling will cause crushing of the pea stone cover and should be avoided.

Another type of surface treatment or seal coat with which excellent results have been obtained, calls for the use of 85 percent asphaltic oil (approximately grade SC-5 of the proposed specifications of the A.A.S.H.O.). A hot application at the rate of not more than 0.25 gal. per sq. yd. covered with ¾-in. pea stone produces a highly non-skid surface of extreme durability. As with all surface treatments, poor results may be expected if the work is done during rainy weather unless an anti-stripping compound is used.

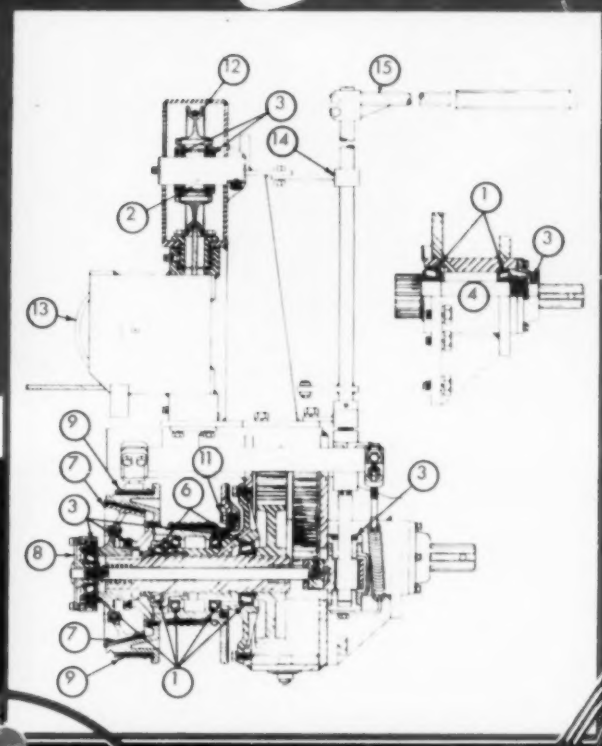
Anti-Stripping Compounds

There are a number of pretreatment, anti-stripping compounds on the market

(Continued on page 122)

HEIL POWER CONTROL UNIT

. . . gives you *instant* cable response for *fast* profitable operation!



POWER TAKEOFF ADAPTERS AVAILABLE FOR ALL CURRENT MODEL TRACTORS

Heil Power Control Units are designed for use with all makes of tractors from 45 to 150 H.P. The double drum model, shown here, is an all purpose unit providing two-line cable control for operation of Twin-Cable Scoops, or for operating two single cable units such as a Bulldozer-Ripper combination.

Large diameter brake and clutch drums insure smooth, positive action, and ample air cooling surfaces provide rapid heat dissipation. Smooth operating brake and clutch assemblies eliminate shocks and damage to cable, tractors, and auxiliary equipment. Large diameters and smooth-surfaced grooves of the fair lead sheaves and upper reaving sheaves reduce cable wear to a minimum.

Check the outstanding construction and operating features of Heil Power Control Units shown in the cross-section illustrations at the right. Write for new Heil Bulletin No. Z2138.

CONSTRUCTION FEATURES

1. Timken Tapered Roller Bearings (Total of 12).

2. Hyatt Roller Bearings (Total of 8).

3. Oil Seals (17) eliminate oil leakage and dust infiltration.

4. Interchangeable Power Takeoff Adapters for Allis-Chalmers, Caterpillar, Cletrac, and International - Harvester tractors.

5. Heavy duty forged alloy steel gears.

6. End thrust carried on oversize Timken Tapered Bearings.

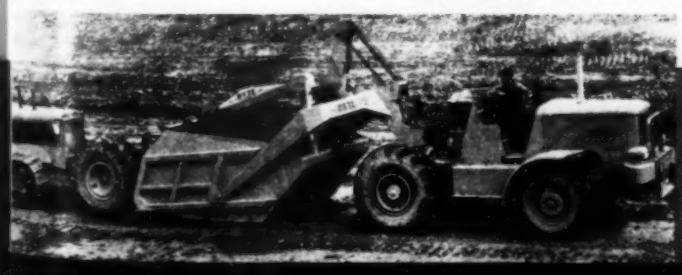
7. Heavy duty cone clutch.

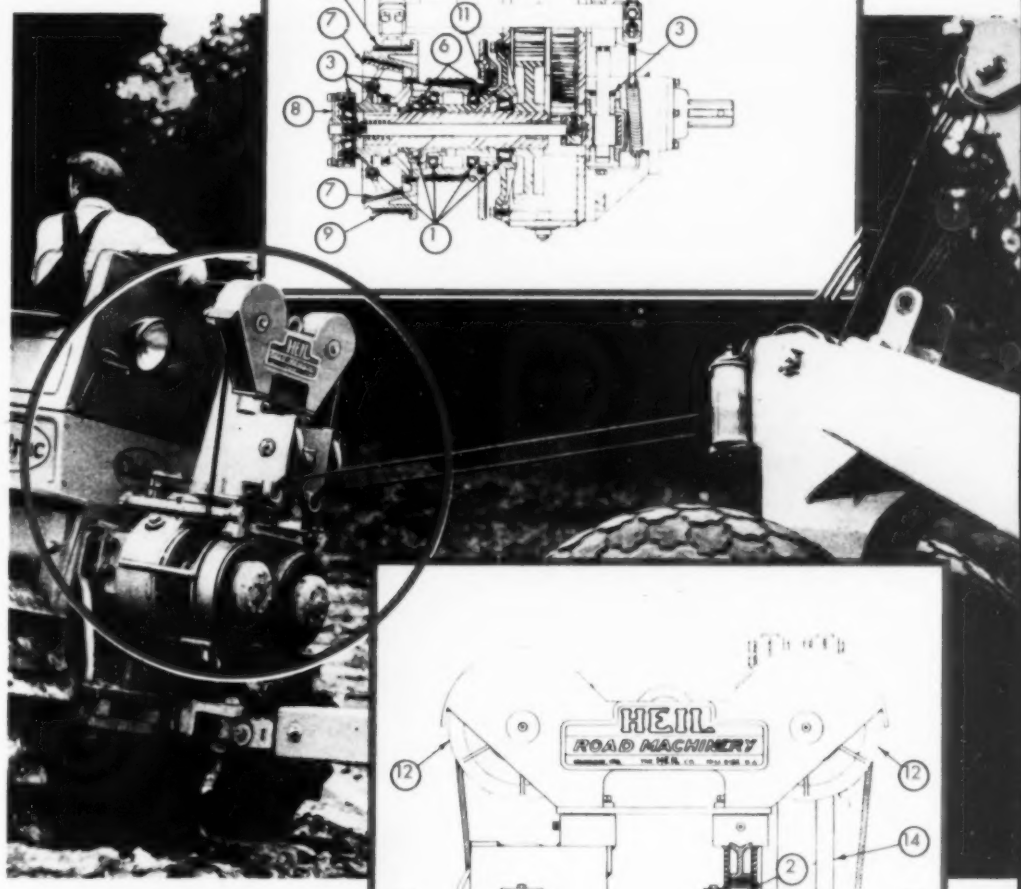
8. Conveniently located clutch adjustment thrust nut assembly.

9. Heavy duty self-energizing brake.

10. Conveniently located brake adjustment set screw.

11. Cable anchoring clamp.





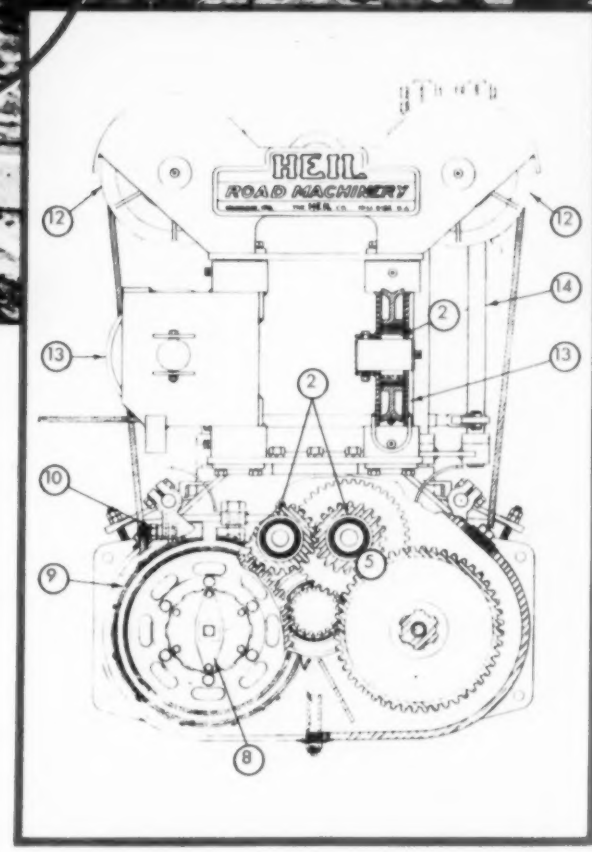
12. Level winding roving sheave running on Hyatt Bearings.

13. Fair lead sheaves, swing on 110° arc.

14. Operating control shafts firmly supported against vibration.

15. Short throw control levers adjustable vertically and radially.

Heil Power Control Unit insures fast, positive operation of Heil Hi-Speed Tractor Scoop.



THE HEIL CO.

GENERAL OFFICES • MILWAUKEE, WISCONSIN

(Continued from page 120)

for use in connection with patching or surface treatment work which have certain merits. Most of these compounds work very well in wet weather and are, therefore, very useful in patching a bituminous macadam surface in the spring. In making surface treatments, because of the close adhesion of the asphalt and aggregate, less stone is lost through the action of traffic, and the amount of stone used may be reduced. Also, in case of a rainstorm occurring during the operation, the stone will still adhere to the asphalt.

The cost of a surface treatment to an asphalt macadam road varies not only with the amount and type of cover used, but also with the locality, which greatly affects the cost of materials. A study of surface treatments made during the last few years, however, indicates an average cost of about $1,800 per mi. of 30-ft. road, which figures about 8c. per sq. yd.

In closing I would like to stress the importance of retaining a well-trained, experienced crew of skilled laborers on maintenance work. The value of experienced labor is well illustrated in the single item of "patching." The knowledge of the correct grading of aggregate to use in a particular patch, and of just how much material to use to attain a smooth surface with an even grade, the correct amount of compaction and, in a penetration patch, just the right amount of bitumen to fill completely the interstices without creating fat spots, is acquired only through years of experience. The retention of such a force in view of the present war effort is likely to become extremely difficult, but in so far as possible in the interest of low maintenance costs, key men thoroughly familiar with the intimate details of maintenance work should be retained.

★ ★ ★

Plywood Cuts Time and Costs In Alien Center Shelters

(Continued from page 70)

plywood design proposed to put studding of the same size on a 2-ft. spacing. The construction would be less, he said, because the plywood, in light, 4x8-ft. sheets, would go on walls and roof much quicker than the other type of construction. The finished appearance would be far superior, he pointed out, and the plywood would not be likely to tear loose and come off, as a building-paper finish frequently does after a little time.

McCarthy got the job Sunday evening, with an OK on his plywood alternate; materials began to flow to the site on the

following day and on Wednesday morning a full force of carpenters, hastily switched from McCarthy's Vallejo housing project, was busily at work at Tanforan. The job was completed in 10 working days (of 12 hr. each), about a week ahead of schedule.

Features of Buildings

The 20x100-ft. buildings, which comprise the major part of this job, are intended to provide shelter of the type that can be built in minimum time at lowest cost. Each of the five 20x20-ft. units or compartments in the standard building has one door and four 3x3½-ft. sliding windows. Studding on one side of the windows is placed on the flat to allow space for the sash to slide.

Floor joists are 2x8's on 2-ft. centers; a single 2x4-in. plate is used at the top of the walls which are made just high enough so that an 8-ft. piece of plywood reaches from lower to upper plate and can be nailed to both. To the bid price was added $125 per building, regardless of the construction type, where foundations had to be built up from uneven ground or in areas of high water table.

Application of Plywood

Adoption of the plywood type of construction gave opportunity for extensive use of this material in window framing, in window sills and for trim generally. All plywood is ¼-in. thick except the ⅜-in. plywood with a rough finish used on the roof. Douglas fir plywood was used exclusively. Only a very small percentage of the panels had to be cut. Normal construction procedure, after the frame had been completed, was to stack the 4x8-ft. plywood pieces in a row along the sides of the barracks. Thus the carpenters had only to move them over into position and nail them in place. The general appearance of the job finished in this way is much neater and more attractive and is expected to be more durable than the vertical boards with paper and batten cover.

The only utility included in the price stated is the interior electric wiring in each structure, consisting of a longitudinal run through the center of the building with one socket for a drop light in each family unit. A metal chimney outlet is flashed into the roofing of each unit to permit of setting up a wood stove.

Rafters are on a 2-ft. spacing, are sheathed with ⅜-in. plywood, and the roofing consists of 15-lb. felt paper fastened down at gables and eaves by 1x4-in. battens.

Because of the light and temporary nature of these structures, no concrete footings were put in. Studding in the walls below floor level was placed directly on 2x4-in. redwood mud sills laid on the ground surface.

Military Buildings

The military buildings required included two of the 20x100-ft. size as well as storehouse, warehouse, mess kitchen, etc., These buildings for the military personnel were given an interior plywood finish with rustic on the outside. Both interior and ex-

(Continued on page 124)

(Continued from page 123)

terior wood was given two coats of paint.

The construction program worked out by the Robert McCarthy Co. for this job divided the construction crews into four divisions of about 100 men each, each division in charge of one superintendent to whom three foremen reported. Ted H. Johanns was general superintendent, reporting directly to Mr. McCarthy.

★ ★ ★

Rolled Earth Fill

Forms 2,500,000 Cu. Yd. Sepulveda Dam

(Continued from page 52)

Blue Diamond Corp. of Los Angeles. Rock paving and toe protection was furnished under a lump-sum contract by Tobin Quarries, Inc. of Kansas City, Mo.

Earth fill for the embankment was obtained, to a limited extent, from excavation for the spillway and outlet structures and principally from a borrow pit which was worked by two types of equipment, one comprising Caterpillar tractors and LeTourneau carryall scrapers, and the other 13-cu. yd. Euclid wagons powered by 150-hp. Cummins diesel engines and loaded by Caterpillar elevating grader. Fill was deposited in 6-in. layers, moistened with sprinkler trucks to obtain optimum water content and compacted by sheepsfoot rollers. The methods of moisture control and compaction employed produced fill weighing 130 lb. per cu. ft., in place.

Driving Steel Piles

Construction of the spillway and outlet structures required the driving of a large number of bearing piles in the form of 12x12-in. Carnegie steel H-beams from 25 to 60 ft. in length, in addition to Carnegie Z-type steel sheetpiling to provide a cutoff. For this work the Tavares Construction Co. designed two large all-steel piledriving rigs with 90-ft. leads, as illustrated herewith. They were equipped with 3-drum American hoists and Clyde bull engines and operated Vulcan and McKiernan-Terry steam hammers. Supplementing these rigs was a P&H crane equipped with swinging leads and pile hammer which drove about half of the sheetpiling for the cutoff.

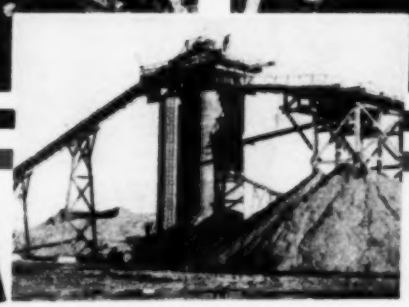
The spillway and outlet works construction also involved the placing of 70,000 cu. yd. of concrete, mixed at a central plant and delivered in 3-cu. yd. Gar-Bro buckets by Ford trucks. The buckets were handled at the pouring site by Koehring and Bucyrus-Erie cranes. Poured concrete was vibrated by six Chicago Pneumatic vibrators.

The accompanying photographs illustrate typical equipment and methods employed by the contractors on the Sepulveda Dam project.

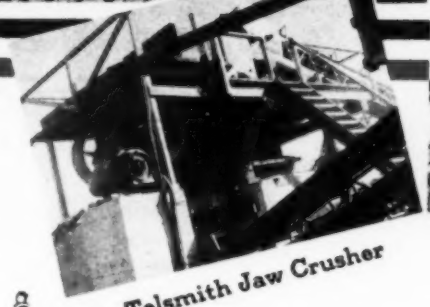
TELSMITH Gravel Plant

goes all out

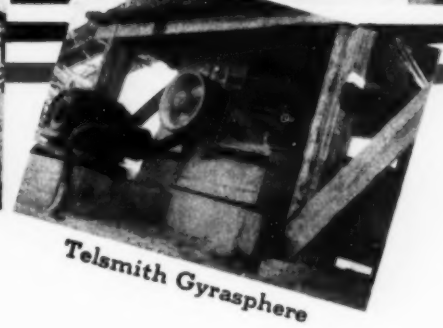
FOR WIN-THE-WAR CONSTRUCTION



Telsmith Sand Tanks



Telsmith Jaw Crusher



Telsmith Gyrasphere

★ Minus and plus ¾″ and minus 1½″ gravel, and sand is in demand for war projects in the vicinity of Pawtucket, R. I. Starting operation Nov. 1, 1941, this new Telsmith equipped gravel plant of J. J. McHale & Sons near Pawtucket is turning it out at about 125 to 150 tons per hr.

A 1¼ cu. yd. shovel and two end dump trucks feed raw bank run gravel into an 8 cu. yd. hopper having a railroad rail grizzly that rejects the few oversize boulders. A 30″ x 5′6″ Telsmith Reciprocating Plate Feeder feeds material out of hopper and over a No. 450 Telsmith Rotary Grizzly with 3¼″ spaces. Plus 3¼″ goes to an 18 x 30 Telsmith Roller Bearing Jaw Crusher. A 30″ x 73′ belt conveyor takes minus 3¼″ direct from the grizzly, and from the jaw crusher, to a 4′ x 10′ Telsmith Single Deck Pulsator. Plus 1½″ from this scalping screen goes into a No. 36 Telsmith Gyrasphere Crusher; and when crushed returns to the 30″ primary conveyor via an 18″x48′6″ conveyor.

Minus 1½″ from the scalping screen goes via a 24″ x 186′6″ finished product conveyor to a 5′ x 12′ Telsmith 2-Deck Pulsator for washing and sizing. Sand is flumed to two No. 8 Telsmith Sand Tanks on a tower independent of main plant. The two sizes of gravel are deposited in two 20′ diam. concrete-block silo bins, fitted with bin gates for loading into trucks.

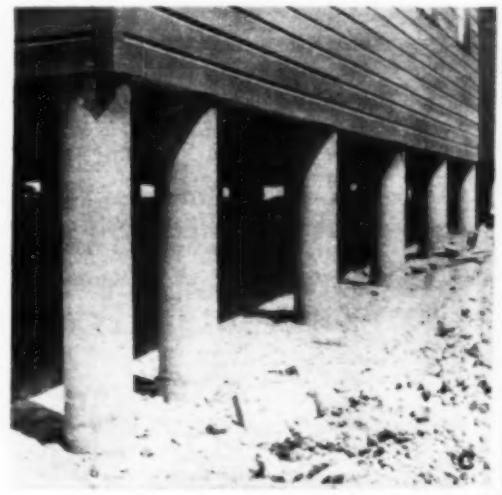
Why do so many operators with war construction jobs depend on Telsmith? Because Telsmith equipment can be pushed to *top speed* and *will produce*. Telsmith Engineers' plant planning is sound. Telsmith Service is fast. *Get Bulletin G-10.* G-10

SMITH ENGINEERING WORKS, 510 E. CAPITOL DRIVE, MILWAUKEE, WISCONSIN

Cable Addresses: Sengworks, Milwaukee—Concrete, London

Room 1604—50 East 42nd St. New York City
211 W. Wacker Drive Chicago, Ill.
713 Commercial Trust Bldg. Philadelphia, Pa.
19-21 Charles St. Cambridge, Mass.
Borchert-Ingersoll, Inc. St. Paul, Minnesota
Brandeis M. & S. Co. Louisville, Ky.
Charleston Tractor & Eqpt. Corp. Charleston, W. Va.
Roanoke Trac. & Eqpt. Co. Roanoke, Va.
North Carolina Eqpt. Co. Raleigh and Stateville, N. C.
Wilson-Weesner-Wilkinson Co. Knoxville and Nashville, Tenn.
G. F. Seeley & Co. Toronto, Ont.

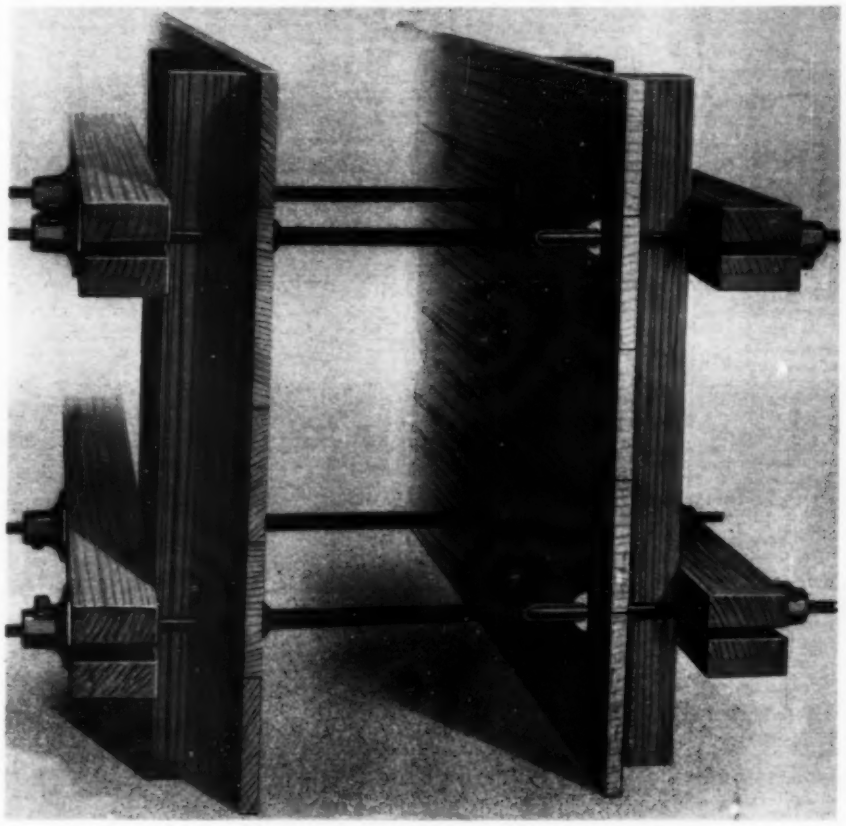
LAMINATED PAPER TUBES for forming circular concrete piers or columns, used in place of ordinary square piers under camp buildings, are supplied in lengths up to 24 ft. which can be cut by hand saws (photo A) to lengths required on job. Paper laminations are spiral wound to make tube which is strong enough to hold wet concrete and to permit handling and storage without damage. Inside of tube is oil-treated. Tubular forms are set in pits and braced with wood framing (photo B) before being filled with concrete. Paper form may be stripped from concrete pier or left in place to slough off (photo C). Tubes are supplied in three standard inside diameters: 9 in. (equal to 8x8-in. square pier), 11¼ in. (equal to 10x10-in.), and 13½ in. (equal to 12x12-in.)—**Sonoco Products Co., Hartsville, S. C.**



UNIVERSAL
Form Clamps with Spreader Cones

Save Steel for Victory

Re-Use Your Concrete Forms and Ties with a minimum loss of steel!



Form Clamps and Spreader Cones are re-used indefinitely.

●

Tie Rods are pulled from the wall and re-used numerous times.

●

An inexpensive and efficient Tie with a Positive Spreader.

●

Furnished for use with ¼ in., ⅜ in., ½ in. and ⅝ in. Plain Round Rods.

UNUSUAL STRENGTH

This combination of Spreader Cones and Paper Tubing provides a very efficient spreader with unusual strength. Because the Tubing always contains a rod when in use, it cannot buckle—there is no place for it to go, and the ends are snugly secure between the cones and the rod. The Paper Tubing is of multiple-ply strawboard, Kraft covered, heavily impregnated with paraffin at a high temperature.

EXTREMELY LOW COST

The low cost of this combination of Form Clamps, Spreader Cones and Paper Tubing is apparent at once. Only the Paper Tubing is left in the wall. The Form Clamps are removed, the rods are pulled with a Rod Puller, the Cones tapped out, and all are available without extra labor for use on the next section. The actual cost is the Paper Tubing remaining in the wall.

Send for our Catalog today for complete information on UNIVERSAL Products for concrete construction, including form design tables

UNIVERSAL FORM CLAMP COMPANY
972 Montana Street, Chicago, Illinois
ATLANTA • HOUSTON • CLEVELAND • NEW YORK

●

If It's a Form or a Form Tie—We Can Make It

WHERE TO BUY

Featuring additional Products and Specialties for the Construction Industry

NEW ADVERTISEMENTS
received by June 22nd appear in the July issue, subject to space limitations.
Address copy to the Departmental Staff
CONSTRUCTION METHODS
330 West 42nd St., New York City

This WHERE TO BUY *Section*

supplements other advertising in this issue with these additional announcements of products and services essential to efficient and economical operation, maintenance and service. Make a habit of checking this page, each issue.

Departmental Staff, CONSTRUCTION METHODS

CHANGE-OF-ADDRESS COUPON

CONSTRUCTION Methods
330 W. 42nd Street, New York, N. Y.
Please change my mailing address

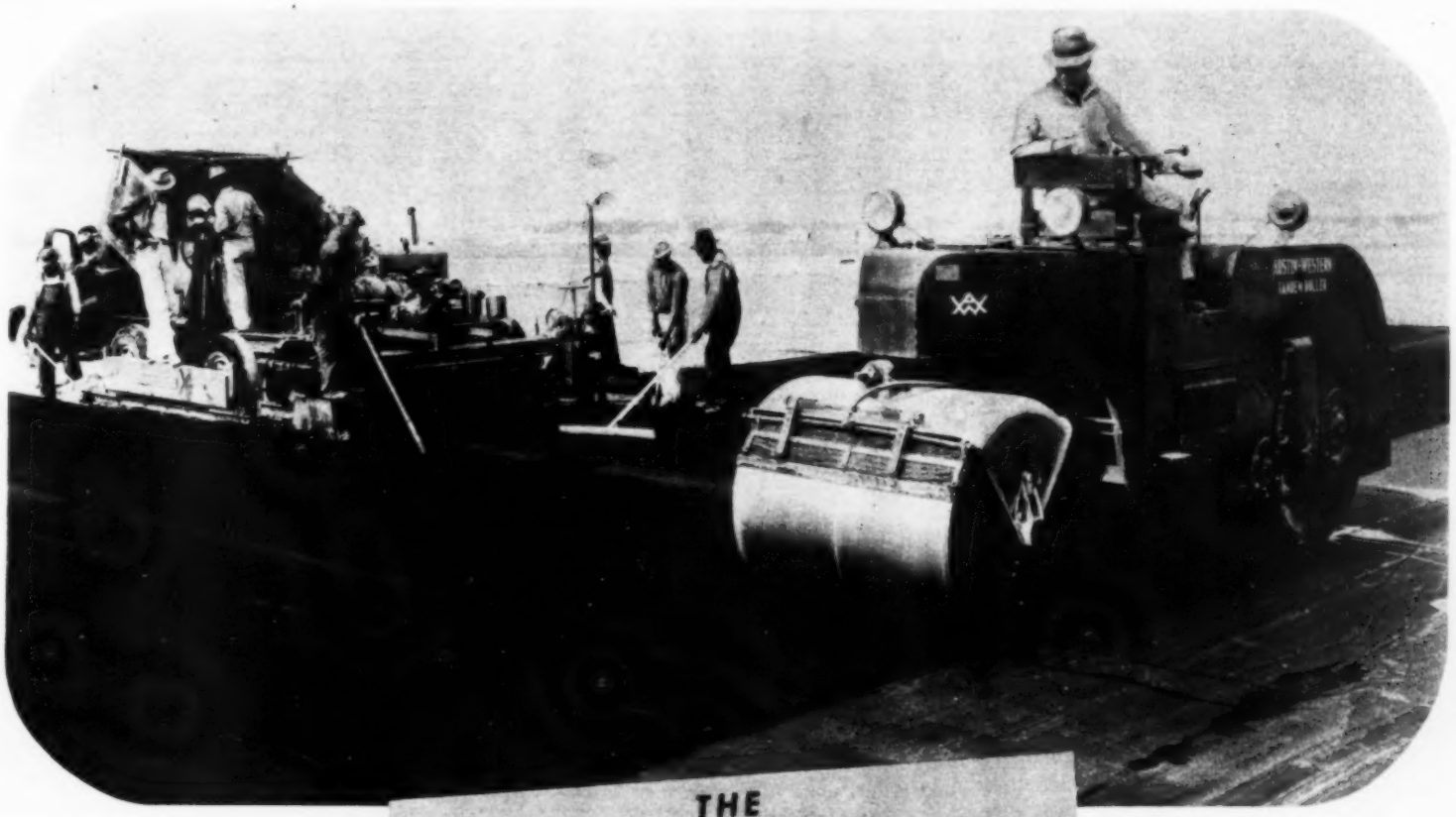
FROM
- Name .....
- Street .....
- City ..... State .....

TO
- Street .....
- City ..... State .....
- Company ..... Position .....
- Nature of Business .....

CHANGE-OF-ADDRESS COUPON

GETTING THERE ON TIME . . . with plenty of what it takes for quick, decisive Victory, requires that every addition to America's vital transportation system be completed in record time . . . calls for road-building equipment engineered to make every minute count.

DOES A LOT OF ROLLING JOBS A LOT FASTER



THE
Austin-Western
TANDEM ROLLER

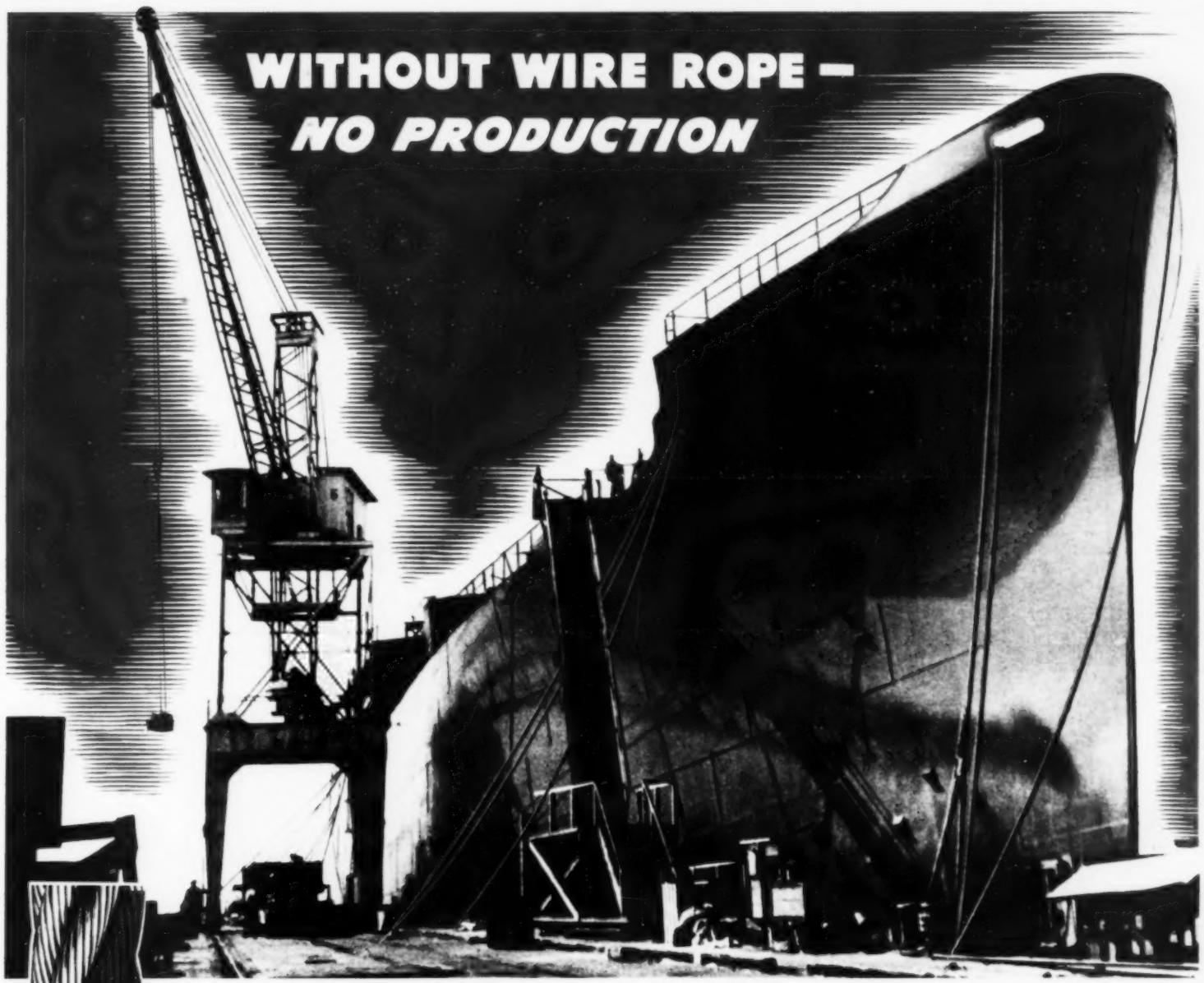
● Your best bet for fast, accurate rolling of airports and strategic highways is the Austin-Western Tandem. Better visibility, more convenient controls, less frame overhang, and effortless hydraulic steer permit closer, faster work. Variable weight and smooth power provide accurate operation to meet the widest variety of rolling requirements. A-W Tandems change direction — forward or backward — with a vibrationless smoothness that means a better job and less wear on the machine itself. A low center of gravity prevents side sway.

A-W variable weight Tandem Rollers in 5 to 8 ton and 8 to 10½-ton sizes are available for vital construction operations. Write for complete details on construction features and operating advantages.

THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois

MOTOR GRADERS • BLADE GRADERS • ELEVATING GRADERS • SCRAPERS • CRUSHING AND SCREENING PLANTS • ROLLERS
ROLL-A-PLANES • MOTOR SWEEPERS • SHOVELS AND CRANES • SCARIFIERS • DUMP CARS • TRAIL CARS

Advertisers in this issue



WITH TRU-LAY *Preformed* WIRE ROPE—

MORE PRODUCTION Your machines will operate with fewer interruptions for wire rope replacement if they are equipped with American Cable TRU-LAY PREFORMED. That means steadier production; time and money saved; steel conserved. . . . Regardless of application, American Cable TRU-LAY PREFORMED WIRE ROPE invariably lasts longer than ordinary non-preformed rope. It gives you greater dollar value in increased service alone. But TRU-LAY does much more than this. It handles much easier, faster, *safer.* It is a flexible, tractable, willing-to-work rope—not the kinky, unruly kind that fights the men who are working with it. It spools on the drum better; runs true and straight over sheaves; requires no seizing when cut. . . . Aid production—conserve steel—save money by using American Cable TRU-LAY PREFORMED WIRE ROPE.

AMERICAN CABLE DIVISION

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles,
New York, Philadelphia, Pittsburgh, San Francisco

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT • CONNECTICUT

ESSENTIAL PRODUCTS . . . AMERICAN CABLE Wire Rope, TRU-STOP Emergency Brakes, TRU-LAY Control Cables, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Iron Castings, CAMPBELL Cutting Machines, FORD Hoists and Trolleys, HAZARD Wire Rope, Yacht Rigging, Aircraft Control Cables, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

Essential to steel production, construction and agriculture, limestone is a vital material in the Victory production program. Two limestone quarries (shown here) of the world's largest producers, located in northern Ohio, have used Timken Rock Bits for several years.

If the advantages of Timken Bits were significant enough for these operators to adopt them in peace time it is certain that these advantages have been greatly magnified by the war.

If you are not using Timken Bits you will never gain more by adopting them than you can today. And every day you wait before investigating their possibilities costs you money. To request further information write your name and address on the bottom of this page. Tear out the bottom half of the page, put in envelope addressed to us.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

ROCK BITS